Met.O. 814

The Marine Observer

A quarterly journal of Maritime Meteorology

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THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE

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Editorial

BM = I/V. This simple formula must surely bring back rather vividly to any Master Mariner his struggles in a navigation school to acquire some essential knowledge about the mysteries of ship stability. And most of us who have served as Mate or Master of a cargo ship have, at times, been glad that we had been forced to unravel these mysteries, whether our own ship's stability problem had to be solved rather laboriously by hand or with the aid of a mechanical stability indicator. Maybe we had to borrow a textbook from the 2nd Mate to refresh our memory about the detailed procedure for working out the GM for any particular voyage or in order to try and figure out what the worst slack-water or slack-oil effect upon the ship's stability might be during the course of the voyage.

It is much easier nowadays than in the past for a shipmaster and his officers to be stability conscious now that it is a legal requirement, as prescribed by the International Convention for Safety of Life at Sea, for each merchant ship to be supplied with basic stability data and drawings applicable to that particular ship in certain standard conditions. But it is no use having stability curves and GZ values aboard a ship if you do not know how to use them and the sums have still to be worked out to find out the GM for any particular cargo distribution. One does not read of many cases of a merchant ship getting into serious trouble due to deficient stability in the intact state; it is only, for example, if she gets holed or if there is perhaps an injudicious use of water in combating a fire aboard, causing the slack-water problem to rear its ugly head, or if cargo shifts in heavy weather that the ship's stability becomes a major preoccupation.

Once a ship puts to sea her stability becomes a dynamical rather than a statical problem and it is here that meteorology comes into the picture. It is fairly obvious that if there were neither wind nor waves or if the wind were steady in force instead of being gusty, as it nearly always is, or if there were no risk of icing on deck or (say) accumulation of moisture on a timber deck-cargo, a positive GM of almost any magnitude would be satisfactory. As any seaman knows, with prolonged high waves abeam, a large GM can be quite dangerous to the ship as well as being highly uncomfortable, whereas the greatest danger to a 'tender' ship is probably the gustiness of the wind associated with high waves. And, in most cases, the tender ship does not get into serious trouble until something shifts or some extraneous water gets into her and introduces the slack-water complication. The loss of the passenger ship *Vestris* in 1928 is perhaps a classic example of the disastrous effect upon a ship's stability of water getting into openings in the side of a heavily-listed ship. Fortunately cargo ships do not usually have openings in the side and most of them nowadays have steel hatches—but ships do get leaks by various means and the danger does exist.

The Maritime Safety Committee of the Inter-Governmental Maritime Consultative Organization (IMCO) has a subcommittee which has, for several years, been investigating questions concerning the subdivision and stability of merchant ships—both from the intact and damaged viewpoint. This subcommittee has been investigating the effect of all external forces which affect the ship's stability—gusty wind, high waves, excessive moisture on deck cargo, and icing, in consultation with the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission (IOC). The subcommittee has, in particular, been studying wave spectra and the relationship between visual and measured wave data and has been investigating the heeling moment suffered by a ship due to wind pressure. Marine observers can thus feel that their wave observations are being put to another practical use.

This subcommittee is also giving detailed study to the stability of fishing vessels, with special emphasis on the effect of icing. Figures have been prepared as to the weight of ice per square metre on all exposed weather decks which fishing vessels, operating in areas liable to icing, are considered to be able to tolerate in safety.

Anybody who has served regularly on the North Atlantic trade will have experienced icing on deck, to some extent, off the east coast of North America/Canada in the winter-time. But this problem is not normally very serious to a merchant ship, even if only because she usually passes through the icing area fairly quickly and also because of her relatively high free-board. In the case of a trawler fishing in Arctic waters the problem is much more serious because of the length of time she stays in the area and also because of her low free-board and relatively large top hamper for her size. The modern stern trawler is so designed as to minimize the amount of top hamper that she has. The *Arctic Pilot* tells us that the only safe action for a trawler to take if gales associated with very low temperatures are forecast or being experienced is to seek warmer water or shelter. But obviously it is not always easy to do this. An article by Dr. Mertins on this general subject of icing on trawlers appeared in the July 1968 number of *The Marine Observer* and referred to the loss of the British trawlers *Lorella* and *Roderigo* from this cause in January 1955.

As a result of the loss of two other British trawlers, *Ross Cleveland* and *Kingston Peridot*, in exceptionally heavy weather and sub-freezing temperatures in the winter of 1967/68, the Board of Trade appointed a committee to examine the major factors affecting the safety of deep-sea trawlers and their crews and to make recommendations. This committee is still in session, but issued an interim report in September 1968, as a result of which the stern trawler *Orsino* has been chartered by the Board of Trade and has been operating in Icelandic waters since the end of November in order to provide a weather advisory service, a centralized communication service (for safety checks, search and rescue action, etc.) and an experimental medical service for British trawlers fishing in that area. The Advisory Officer aboard the *Orsino* is a mariner and he has the assistance of a meteorologist. There is also a doctor on board. The primary duty of the meteorologist is to keep the Advisory Officer informed about the weather situation in general and in particular about any aspects of the weather which he considers likely to be of danger to the trawlers, with special emphasis on severe icing conditions. He is in hourly radio contact with Bracknell for the purpose of transmitting weather reports from the *Orsino*, for relaying weather reports received from trawlers in the vicinity (for which special arrangements are made) and for the reception of weather bulletins, including forecasts and warnings from the Central Forecast Office. He has on board a facsimile receiver which provides him with all the necessary weather maps. The Advisory Officer maintains regular radio contact with all British trawlers in the area, checks their positions and gives individual or collective weather and related safety advice. Under the present arrangements the Advisory Officer makes a daily situation report by radio to the appropriate authorities at noon giving the position of the *Orsino*, her intended movements, weather, visibility, icing conditions and movement of pack ice, positions of all trawlers in the area and the names of those which have arrived or left the area during the past 24 hours. The Advisory Officer has no power to give orders to the skippers of the trawlers; he merely gives advice as to the desirability of getting into warmer water or taking shelter, in the light of existing or forecast weather. Each skipper must decide whether or not to accept such advice.

In order to maintain constant radio watch, the *Orsino* carries four radio operators. The contact with the trawlers themselves is by W/T or R/T as convenient; the contact with Bracknell is by H/F W/T through Portishead Radio.

The interim report of the Committee of Inquiry does not suggest that the provision of the meteorologist aboard *Orsino* implies any criticism of the weather forecasting services provided by the United Kingdom or Iceland. The value of the meteorologist aboard the ship is that he can "produce fuller and earlier information than the conventional forecasts transmitted from land. The advisory ship would compare these forecasts with actual conditions in the area and, when necessary, could seek further guidance from the Meteorological Office in the United Kingdom. If a qualified meteorologist was available on board, special local forecasts could also be issued."

Meanwhile there is the problem of a trawler's stability once she has got an accumulation of ice on her superstructure and how best to get rid of that ice once it has started forming. The stability question is under urgent consideration both nationally and internationally. As for getting rid of the ice, up to the present the usual method (as in a merchant ship) has been to chip it away with axes, wooden battens, etc. The crews of the U.S. Coast Guard Cutters which spend much time in Arctic waters are very experienced in this problem and are supplied with baseball bats which they have found to be the best weapon for this job! Steam hoses and coatings of some chemical de-icing paste have been tried with varying success and experiments are now being made with a pneumatic rubber apparatus on the higher parts of the superstructure.

The hard facts of life are that the best fish are to be found in cold water. Although much has been done during recent years to ease the job of the trawlerman—particularly now that the stern trawler enables the work of gutting and sorting to be done below decks—it seems that there will always be an element of danger and discomfort in this industry. The aim, both nationally and internationally, must be to reduce the danger and the discomfort as far as is economically practicable.

C. E. N. F.

Report of Work for 1968

(MARINE BRANCH AND MARINE CLIMATOLOGY SECTION OF THE METEOROLOGICAL OFFICE: VOLUNTARY OBSERVING FLEET AND OCEAN WEATHER SHIPS)

1. Voluntary Observing Ships

At the end of the year the British Voluntary Observing Fleet was comprised as follows:

(*a*) 497 Selected Ships which are supplied with a full set of meteorological instruments on loan and which make observations in code form FM21.D every six hours and transmit them to the appropriate coastal radio station wherever their voyages take them.

(*b*) 58 Supplementary Ships, including 18 trawlers, which make less detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen. They use abbreviated code form FM22.D for their messages.

(*c*) 92 coasting ('Marid') vessels, and one lightship, which make sea-surface temperature observations in U.K. coastal waters and transmit them in a special code by W/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.

(*d*) 15 lightships which make observations of wind, waves, visibility, air and sea temperatures; 13 of these send coded reports by R/T, the other two record their observations for climatological purposes only. The *Dowsing*, *Galloper* and *Royal Sovereign* lightships report barometric pressure using the precision aneroid, and their reports are included in the BBC 5-minute weather bulletins for shipping. The *Galloper* also reports barometric tendency. The time limit imposed on BBC weather bulletins does not permit the inclusion of the barometric tendencies of the other two lightships.

(*e*) 31 trawlers which make non-instrumental observations only and transmit them by W/T or R/T using the first four groups of FM21.D to radio stations in the U.K., Canada, Iceland, Norway or U.S.S.R. depending on the area in which they are fishing. In addition to these, 18 trawlers now figure in the Supplementary Ships' List.

(*f*) 55 Auxiliary Ships which make and transmit visual observations similar to those made by trawlers, with the addition of pressure and air temperature readings from the ships' own instruments (using the 'Shred' code). These ships do this work only when in areas where shipping is known to be sparse.

The total number of British Voluntary Observing Ships taking part in this scheme represents about 14 per cent of the world total of some 5,400 observing ships belonging to various maritime countries. The total British merchant fleet is now about 11% of the world total so our contribution to this scheme is already appreciable. Nevertheless, in view of the great value of observations from the oceans, endeavour is being made to increase the number of British Voluntary Observing Ships by 50 a year during the next four years as part of the U.K. contribution to World Weather Watch. This hoped-for increase will not be easy to achieve in view of the tendency for merchant ships to increase in size and speed with consequent reduction in the number of ships needed. During the year several ships were withdrawn from the North Atlantic trade, for example, and were replaced by larger and faster ships, one new ship often replacing two or more smaller ones. This tendency has been accelerated by the increasing use of container ships and bulk carriers which are replacing the conventional cargo ship. These ships are able to carry considerably more cargo during a year than conventional ships can because they are so easy to load and discharge and thus the ships' turn-round time in port is very much less. During the years ahead it seems likely, therefore, that there will be a reduction in the number of ships plying the trade routes of the world.

The British Voluntary Observing Fleet includes ships of more than 100 shipping companies and comprises ships of all types, from large passenger ships to the humblest coaster and the distant-water trawler, in addition to H.M. survey ships and the research ships *John Biscoe*, *Shackleton*, *Discovery*, *Ernest Holt* and *Explorer*. Table 1 shows the variety of trade routes on which they are engaged:

Table 1. Average numbers of British Selected and Supplementary Ships on main trade routes to and from the U.K.

Australasia	99	South America	19
Far East	93	Pacific Coast of North America	12
Persian Gulf	33	Europe	49
South Africa	32	Falkland Islands and Antarctic	2
North Atlantic	96	World-wide 'tramping'	84
West Indies	36		

The direct administration of this work, including the recruitment of the ships and supply and replenishment of instruments and instructions, is carried out by Port Meteorological Officers and Merchant Navy Agents at the major ports in the U.K., all of whom are Master Mariners with experience of voluntary observing at sea, who maintain personal contact with the shipmasters, deck and radio officers as often as possible, ideally every three months. It was due to the hard work of these gentlemen and the ready co-operation of shipowners operating ships in distant seas that, in spite of several frustrating printing delays, most ships had received copies of the new code cards, meteorological logbooks, etc. in time to start observing and transmitting the revised code on 1st January 1968.

Wider administrative contact is maintained by the Marine Branch at Bracknell where every meteorological logbook and form which is received becomes the subject of a personal letter to the master. Personal record cards are kept and visits by voluntary observers on leave from their ships are encouraged. There can be little doubt that this personal contact, bringing goodwill on both sides, has been a major factor in maintaining the high quality of this service throughout its long history.

Throughout their voyages, the officers aboard voluntary observing ships record their observations in logbooks four times daily in addition to transmitting them by radio, and at the end of the voyage these are returned to the Marine Branch for scrutiny and extraction of the data. During the year 1,099 meteorological logbooks were received from the regular observing ships in addition to 182 forms on which Auxiliary ships, which are not supplied with instruments, recorded their observations.

Observations from all types of ships were mostly of a high standard and often went into considerable detail not actually called for by the meteorological code, e.g. time of wind shift, time and duration of precipitation, etc. There still appears to be considerable enthusiasm for this work among ships' officers in spite of increasing demands made on their time in the performance of their normal ship duties, and the reduction in the number of junior officers carried aboard ships of many of the large shipping companies. Though the majority of British merchant ships carry only one radio officer, the number of radio weather messages cleared to coastal stations in various parts of the world is very creditable. Most ships now seem to be aware that a late transmission can be of very considerable use to a forecaster and, in consequence, it is not uncommon for all four synoptic observations to be transmitted from a 'single operator' ship, where the radio office is manned for only 8 hours a day. Many such messages have indeed been transmitted during a radio officer's off-duty time, whilst observations are frequently made and transmitted at the intermediate synoptic hours during tropical storm conditions.

During two typical days, one in June and one in December, the total number of reports from ships received in the Central Forecasting Office at Bracknell from various sources is shown in Table 2.

Table 2. Total number of reports received at Bracknell by various sources from ships during two typical days in the year

	JUNE	*DECEMBER*
Direct reception from		
British ships in North Atlantic	71	90
Foreign ships in North Atlantic	8	12
British trawlers in North Sea	7	9
British merchant ships in North Sea	21	28
	107	139
Via other European countries		
Ships in North Atlantic	401	280
Ships in Mediterranean	42	72
Ships in North Sea	104	124
Ships off North Russia	23	40
Ships in Pacific	73	94
Ships in other waters	14	146
	657	756
Via North America		
Ships in North Atlantic	561	407
Ships in Pacific	511	432
Ships in other waters	25	19
	1097	858

As an additional contribution to World Weather Watch the U.K. is aiming to equip up to 10 merchant ships for making radiosonde soundings during the next four years. The first of these ships, the Sugar Line's bulk carrier *Sugar Exporter*, carried two meteorologists on two voyages between mid-January and mid-June, during which over 130 successful radiosonde observations to an average height of nearly 70,000 feet were made. One meteorologist, assisted by a seaman, is now making similar observations aboard the same ship on a round-the-world voyage. The Meteorological Office is indebted to the Sugar Line for providing this facility.

2. Ocean Weather Ships

The British Ocean Weather Ships completed 21 years in the North Atlantic during the year; the present four ships have been in operation for about 9 years and continue to give good service. These ships co-operate with French, Dutch and Norwegian vessels in maintaining constant watch at four weather stations in the eastern North Atlantic while a number of other countries make financial contributions towards the cost; weather ships of the U.S. Coast Guard similarly man four stations in the western Atlantic. At all these ocean weather stations hourly surface and six-hourly upper-air observations (radiosonde and radar wind to an average height of about 65,000 feet) are made and transmitted by radio. In addition the British ships make observations of solar and total radiation, of sea temperature and salinity at various depths down to the sea bed, record magnetic variation and do some biological work, including plankton sampling and fishing for squid. All four ships are now fitted with wave recorders.

Communication facilities and routine navigational aid were provided during the year for trans-Atlantic aircraft by all the weather ships, and their air/sea rescue equipment was kept in a constant state of preparedness. Comprehensive search and rescue exercises were frequently carried out in which RAF aircraft sometimes participated. On 29th March the *Weather Reporter*, while on station 'Kilo' in the Bay of Biscay, rescued the American pilot of a single-engined aircraft, *en route* from Gander, Newfoundland to the Azores, who had been blown off course and was advised to ditch because of shortage of fuel and instrument trouble. The rescue was carried out in darkness with a 23-knot wind and 15-foot swell.

During February and March the British weather ship on duty at ocean station 'Alfa' had on board a Control Officer and provided special advice by radio to British trawlers fishing north of Iceland, at the request of the Board of Trade, as a result of the earlier loss of two British trawlers in the same area during exceptionally severe gales and freezing conditions. Resulting from the interim report of the committee of inquiry into the loss of these trawlers, an Advisory Officer, accompanied by a meteorologist and a doctor, sailed from Hull for Icelandic waters aboard the stern trawler *Orsino* on 29th November and will remain there till the end of April 1969. The *Orsino* was chartered by the Board of Trade and her function is to provide advice and assistance to trawlers in those waters during the winter; she is fitted with special meteorological and communication facilities.

At the sixth ICAO conference on North Atlantic Ocean Stations (Paris, March 1968) it was decided that the present nine-station network should be maintained for a further period of at least 5 years. A meeting of experts was subsequently held in London, at the invitation of the U.K. Government, to consider the most economical method of replacing one of the Netherlands weather ships which will have to be withdrawn, due to age, in 1970.

3. Ice and Surface Ocean Currents

Revision of the ocean current and sea-ice sections of six volumes of the Admiralty *Pilot* was completed during the year and the extraction and processing of ocean current data continued.

The production and issue of the ten-day and monthly ice charts were continued by the Marine Branch, in collaboration with the Central Forecasting Office.

4. Weather Routeing

The Marine Branch has worked closely with the Central Forecasting Office in connection with the scheme, begun in March 1968, for providing weather-routeing advice by radio to North Atlantic ships on request. By the end of December the total number of individual routeings provided under this scheme was 105, of which 39 were for eastbound ships. Altogether the scheme seems to be working very well.

5. Inquiries

There was a substantial increase in the number of marine inquiries during the year, most of which were from solicitors, brokers and insurance companies. Meteorological evidence was prepared for the official inquiry into the tragic loss last February of three trawlers, *St. Romanus*, *Ross Cleveland* and *Kingston Peridot*.

6. Publications

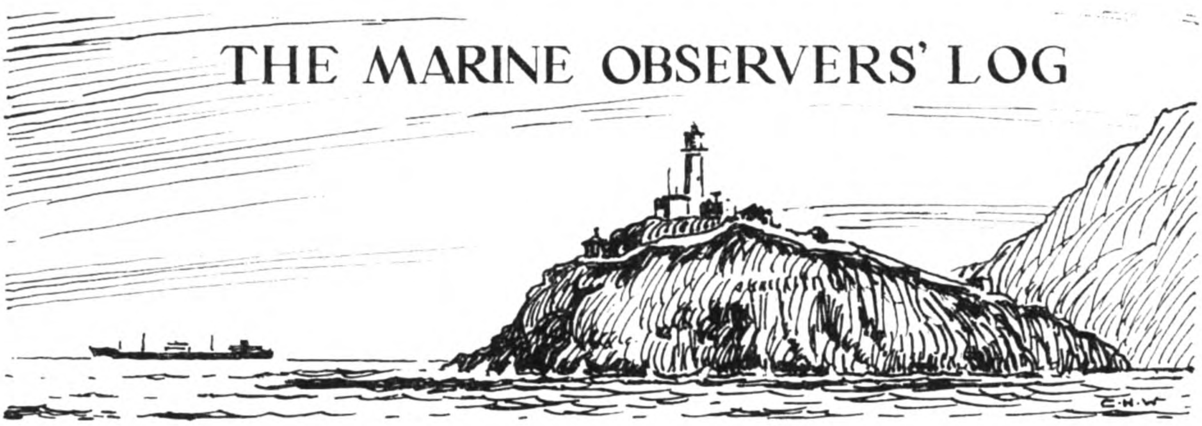
All the marine publications and forms which had been revised last year, because of changes in the ships' meteorological codes, were reprinted in 1968 to replenish the stocks. These incorporated all the revisions which had been promulgated after the earlier editions were printed in 1967.

The preparation and printing of *The Marine Observer* continued as usual and the 9th edition of Met.O.522 *Marine Observer's Handbook* had reached the page-proof stage.

7. Awards to Voluntary Observing Ships

Annual awards of books were made to the master and officers of 100 Selected/Supplementary ships, 4 coasting ships making sea temperature observations and 4 non-instrumental trawlers whose work reached the required standard; barographs were awarded to four shipmasters whose long record of voluntary observing was considered as deserving special recognition.

The books selected for awards were *Cassell's English Dictionary*, *Farming the Sea* by Alexander McKee and *The University Atlas.*



April, May, June

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.

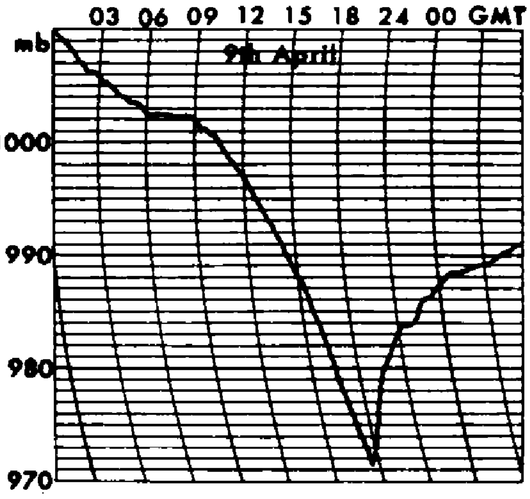
VIOLENT STORM

at Napier, New Zealand

m.v. *Suffolk*. Captain G. W. McCathie, R.D. At anchor.

8th–10th April 1968. The vessel was berthed at Napier. At 0800 GMT on the 8th the barometer was reading 1018·5 mb and falling fairly rapidly. The wind was a steady NE'ly, force 2, and there was a fairly heavy ground swell running in the harbour.

By 0001 on the 9th the barometer had fallen to 1007·8 mb and the wind had freshened to force 3. The sky was completely overcast with a thick layer of Fs as opposed to the almost clear sky 16 hours earlier. At 1000 it started raining heavily and by 1200 the barometer had fallen to 997·0, with the NE'ly wind now force 5. The wind had increased to force 8 by 1400 and the pressure was then 992·6 mb. At 1600 it was possible to see the centre of the storm which appeared in the NE as a circular gap in an otherwise overcast sky, approaching very rapidly and passing about 2 miles to the east. The wind was now a strong force 12, still from the NE, and



pressure had dropped to 985.4 mb. As the storm centre passed, the wind started to moderate and back. At 1800 the barometer reached its recorded lowest of 971·4 mb and after this it started to rise rapidly. The wind was now NNE'ly, force 10. By 2000 the wind was NNW'ly, force 6, and pressure was 975·7. At 2200 the wind was NW'ly, steady force 8, and the barometer had reached 982·4 mb.

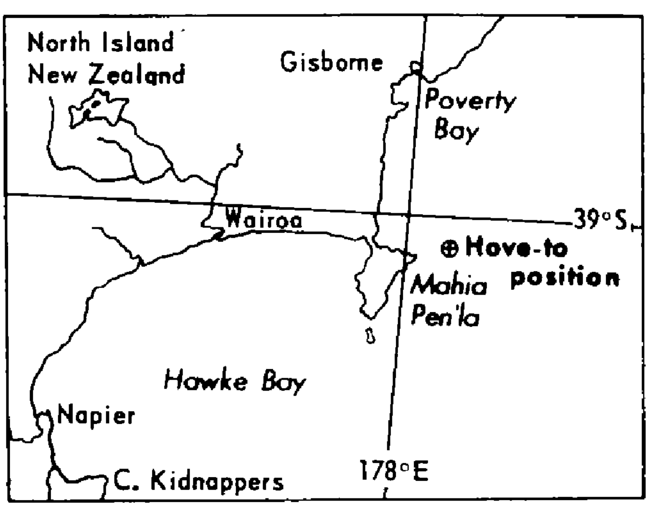
By 0001 on the 10th the barometer had risen to 984·9 with the wind gusting occasionally to force 9 but later, as the storm moved south, moderating gradually until, by 0400, it was N'W, force 4, and the barometer 988·3 mb.

Position of ship: 39° 28'S, 176° 55'E.

New Zealand waters

m.v. *Nottingham*. Captain J. A. North. Napier to Gisborne. Observers, the Master and Mr. D. A. Pidgeon, 3rd Officer.

9th–10th April 1968. At 0630 GMT (1830 LMT) on the 9th we left Napier bound for Gisborne some 90 miles to the NE, normally a 6-hr run. Due to cargo commitments



the vessel was trimming 10 ft by the stern. The wind was ENE'ly, force 5, and the barometer 1005 mb, falling slowly. A storm warning had been received, reporting the centre at Cape North and travelling SSE. This should have taken the storm down the west coast of New Zealand. With this in mind, the ship made all speed to get as far to the eastward as possible. By 1200 the wind had increased to gale force persisting from the NE, the barometer was falling quickly and it began to look as though the storm was heading in the direction of the ship. Being on a lee shore it was decided to head out to sea and ride out the storm. At 1500, steering 050°, the vessel was hove to in gigantic seas and hurricane-force winds. Steering was extremely difficult and engine revs. had to be increased at times to bring the vessel back to the wind; in fact, the only way the ship would steer was directly into the wind. By 1700 the seas and swell were enormous, an estimated 50 ft, the wind was in excess of 85 kt, visibility was nil and the barometer had fallen to 974·3 mb. The ship was labouring badly and rolling and pitching violently. Shortly after 1800 the barometer steadied a little and the wind eased slightly although it remained storm force until 2030 when visibility improved and a position obtained, the radar having been out of action. It was found that the vessel had made good 050° a distance of 6 miles in 5½ hr. Course was altered to the north and the engine revs. increased, but it was not until 0001 that the swell had decreased sufficiently to set course for Gisborne. At 0100 the wind finally backed to NW'ly.

Position of ship at 0630 GMT on 10th: 39° 05'S, 178° 10'E.

Note. The storm encountered by the *Suffolk* and the *Nottingham* has been described as one of the worst in New Zealand in the past 30 years. It was at 0600 LMT on the 10th April (1800 GMT on the 9th) when the ferry *Wahine* (8,948 gross tons), carrying passengers and cars from Lyttelton, grounded on a reef in hurricane-force winds when entering Wellington harbour. A few hours later she keeled over and sank with the loss of 56 lives. We hope to publish a full account of this storm later this year.

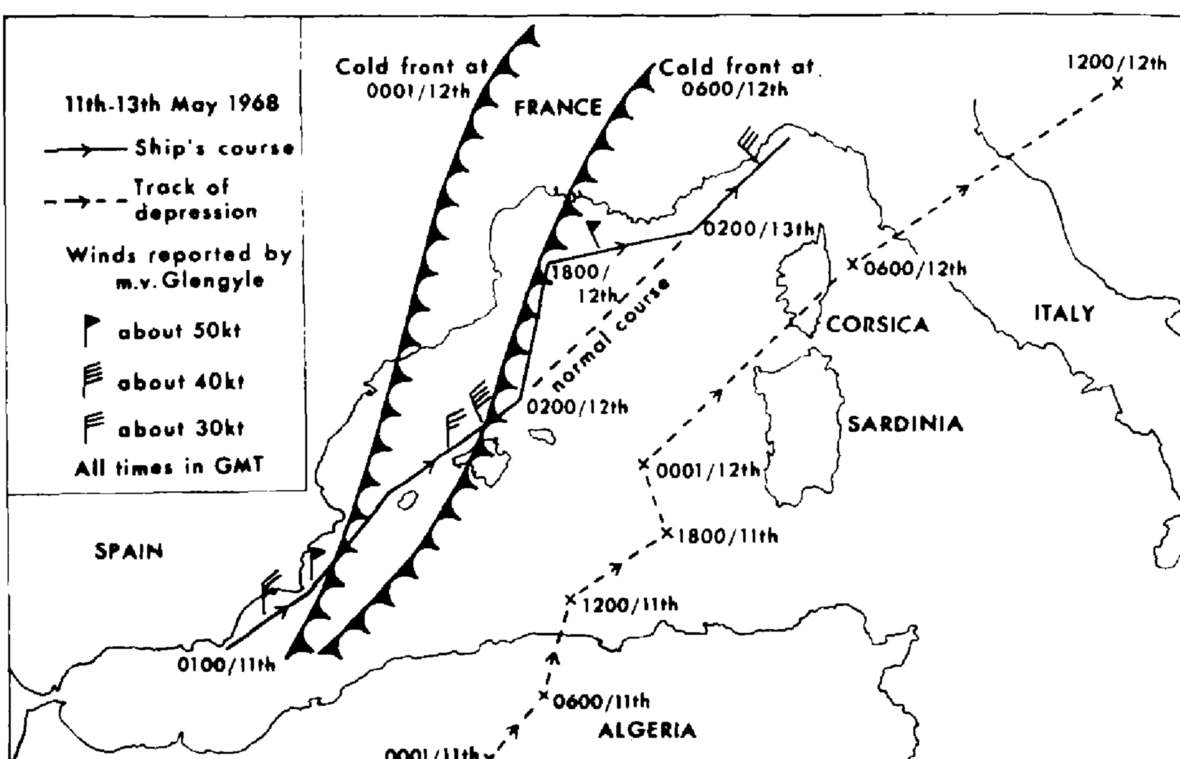
SEVERE STORM

Mediterranean Sea

m.v. *Glengyle*. Captain D. H. Stewart, R.D. Las Palmas to Genoa. Observers, the Master and Mr. P. Barlow-Morris, 3rd Officer.

11th–13th May 1968. During this period we encountered some of the worst weather conditions that the Master and senior officers had ever experienced. The sudden changes in weather, the continuity of a full storm and persistent clear skies in the later stages amounted to a most dramatic period of tempests and sea fury.

After rounding Cabo de Gata in south-east Spain at about 0100 GMT on the 11th, the wind, which had been light and variable with intermittent light drizzle, set N'ly and increased to force 6. At 0510 the rain ceased but, with the barometer falling 5·5 mb in a matter of minutes, the wind increased to force 10. At 0600 the pressure



rose quickly by 5 mb and the wind moderated to force 8–9 but by 0700 had increased to force 9–10, with another sharp drop in pressure, and the rain started again. It was found necessary to reduce speed at this stage but at 1230 conditions improved and full speed was resumed. By 1800, while proceeding up the coast of Majorca, the forecast indicated further gales but the remainder of the evening saw N'ly winds of force 6 with showers and visibility about 3 miles. At 2100 the wind increased and backed to NNW and at 2300, north of Cabo de Formentor, it was gusting to force 8–9.

At 0030 on the 12th the wind had settled in a N'ly direction so speed was reduced and course altered, keeping the wind a point on the port bow. At 0730 the cloud cleared, leaving the ship bathed in bright sunshine, and these conditions continued throughout the day. At 1600 the wind backed to NW and, as it was now slightly abaft the port beam, speed was increased. By 2130 the wind was full force 10 and the ship was taking continuous spray as she ran for shelter under the lee of Cap d'Armes. The seas were 40–50 ft and were speeding past the ship at an estimated 30 kt.

By 0030 on the 13th the effect of the shelter of the land was noticed and by 0400 the wind had backed to SW'ly, force 4, with a rising barometer. Two hours later, although now well sheltered under the French coast, the wind veered to N'W and increased until, by 0730, it was force 7. These conditions prevailed until Genoa was sighted.

Position of ship at 0600 on 12th: 41° 06'N, 3° 48'E.

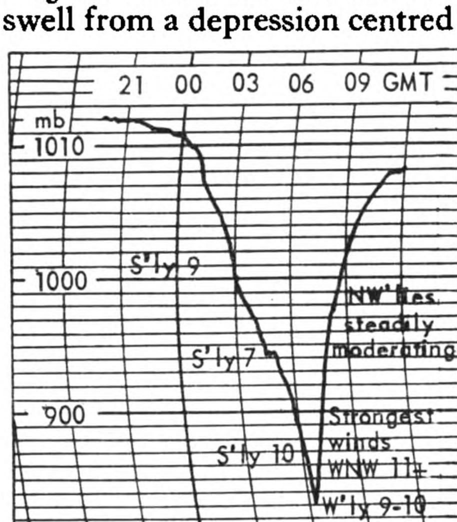
Note. During this period a depression, which first appeared south of Algiers, moved NE'wards across Corsica into the Adriatic. The winds on the north-west side of this depression were strong N–NE'ly, with some coastal stations reporting winds of force 7. There was also a cold front moving south across France into the Mediterranean. The *Glengyle* passed through the front at about 0730 on the 12th and thus gave the ship a day of clear weather. Behind the front, high pressure developed over France to give a pressure pattern that was favourable for the onset of the 'Mistral' in the Marseilles-Toulon area. This probably accounted for the strong wind on the evening of the 12th. By the morning of the 13th another depression had formed in the Gulf of Genoa, giving rise to the reported winds of force 7.

SMALL INTENSE DEPRESSION

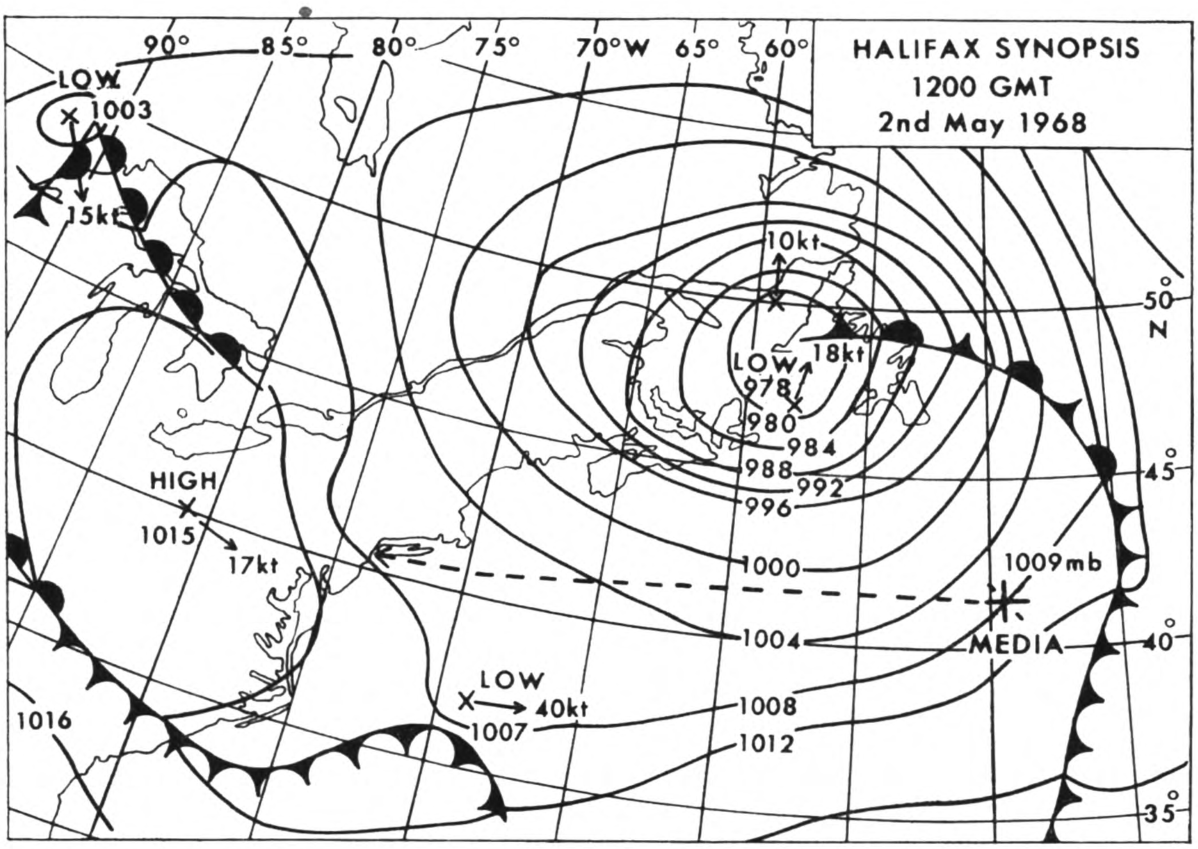
Western North Atlantic Ocean

m.v. *Media*. Captain A. Bull. Liverpool to New York. Observers, the Master, Mr. D. M. G. Murphy, Chief Officer and Mr. R. B. Bradbury, 2nd Officer.

2nd–3rd May 1968. At 2300 GMT on the 2nd the vessel was on a course of 265°, pitching to a heavy W'ly swell from a depression centred over the Avalon Peninsula.



The wind was then ESE'ly, force 3, but it gradually increased and veered until at 0001 on the 3rd it was S'ly, force 9, and a heavy S'ly swell was building. At 0500 the barograph trace, which had been registering a rapid fall, flattened out and the wind



moderated to force 6–7. After about 20 min pressure began to fall rapidly again and the S'ly wind increased to force 10. These conditions continued until 0655, by which time the swell was S'ly, 25–30 ft, causing violent rolling. The barograph trace then began to rise almost vertically and the wind became W'ly, force 9–10, soon becoming NW'ly, force 11–12. The heavy S'ly swell was blown down in 10–15 min and the wind gradually moderated to force 6–7 by 1000. We had no preliminary warning of this storm.

Position of ship at 2300 on 2nd: 41° 02'N, 51° 50'W.

Note. Our 0600 GMT synoptic chart for 2nd May showed a shallow wave near Cape Hatteras in addition to the main depression approaching Newfoundland. This wave moved east so that by 1200 it appeared as a small depression, central pressure around 1002 mb, moving ENE without any signs of deepening, and by 0001 on the 3rd the central pressure was still about the same. However, by 1200 the depression had deepened to about 987 mb. This centre passed about 100–150 miles west of the *Media*, first of all giving very strong S'ly winds, followed by strong W'ly winds as the centre passed to the north of the ship.

WATERSPOUT

North Sea

m.v. *Crouch*. Captain B. R. Fenwick. Rotterdam to London. Observers, the Master and Mr. J. M. Nicholson, 1st Officer.

3rd April 1968. At 1600 GMT, during a heavy snow shower accompanied by vivid fork lightning, a waterspout was observed 45° on the port bow, distance by radar 2 miles, heading in an E'ly direction, speed 20–30 kt. It was approx. 1,000 ft high, with anticlockwise rotation. Wind SW'ly, force 8, with rough sea and heavy NW'ly swell. Ship's course 280° (magnetic).

When abeam of the vessel at 1605, the wind in the area of the ship fell to calm for 3 or 4 min, then became NW–N, force 8–9. Pressure remained steady at 1003 mb during this period. The waterspout was observed until 1615. At approx. 1620 the wind backed to W'ly, force 5–7, weather fine and clear.

Position of ship: 52° 00'N, 2° 30'E.

Note. This is a very useful record since it is rare for a waterspout to be reported in this area. The synoptic weather chart for 1200 GMT showed a deep depression centred over southern Norway, with a cold, unstable NW'ly airstream flowing across the North Sea. Frequent wintry showers and thunderstorms were reported over the sea and coastal areas. Because of the various up-currents and down-currents associated with storm clouds, it is quite possible for short periods of relatively light winds to occur near these storms in an otherwise windy situation.

LIGHTNING

North Atlantic Ocean

s.s. *Surat.* Captain L. C. Kingswood, R.D. Durban to Las Palmas. Observers, the Master, the Chief Officer, Mr. N. R. Messenger, 2nd Officer and Seacunny.

6th April 1968. At 0906 GMT lightning was thought to have struck the sea about 100 ft from the port bow. There was a flash, an extremely loud crack and a small cloud of smoke or water vapour rose to about 12 ft. The 'smoke' remained suspended for about 12 sec and then disappeared. The sea was rippled but there was no sign of disturbance at water level. The flash was seen directly by the seacunny and indirectly by the officer on watch. All on board heard the noise and all the Observers saw the 'smoke'. Cloud, St and Fs with showers of rain. Thunder had been heard earlier. Air temp. 82°F, wet bulb 78°.

Position of ship: 3° 48'N, 12° 26'W.

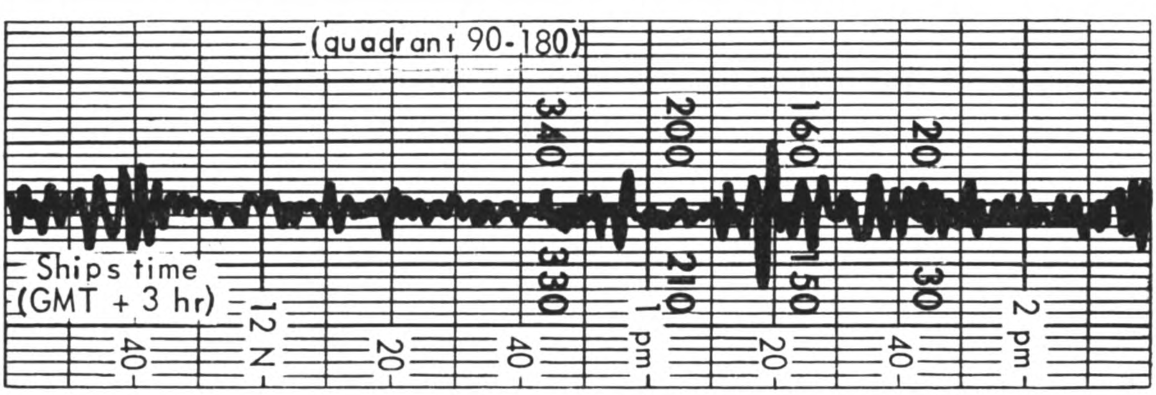
CURRENT RIP

Indian Ocean

s.s. *Zaphon.* Captain S. F. Darroch. Persian Gulf to U.K. Observers, the Master, Mr. M. R. Lowle, 2nd Officer and Mr. P. C. Davidson, 3rd Officer.

7th May 1968. At 0600 GMT the sea began to take on a very confused appearance which bore no relation to the prevailing wind. Water seemed to be heaping up from the NW and breaking to windward as though under the influence of a strong SE'ly set. By 0900 the sea became even more confused and for 3 hours it alternated between three definite types:

1. The normal appearance directly associated with the wind.
2. A broad band of confused water with a large number of 'white horses' all breaking downwind.
3. Broad bands of calm in which both wind and swell effects disappeared.



Throughout the whole period the steering of the ship was badly affected, the ship's head shearing off first one way and then the other, shown clearly on the course recorder chart. By 1200 the sea had reverted to its normal appearance. It was noted that the bands of calm and disturbed water were in a SW/NE line. Two sets were experienced between 0221 on the 7th and 0242 on the 8th, changing from 116° for

9·3 n. miles between 0221 and 1510 to 295° for 4·2 n. miles between 1510 and 0242. At 0600 on the 7th: Air temp. 83·5°F, sea 84·5. Wind S'E, force 6. Course 206° at 16·0 kt.

Position of ship at 0900 on 7th: 4° 29'S, 47° 18'E.

Note. This report was forwarded to Dr. J. C. Swallow, National Institute of Oceanography.

SEA TEMPERATURE CHANGE

North Atlantic Ocean

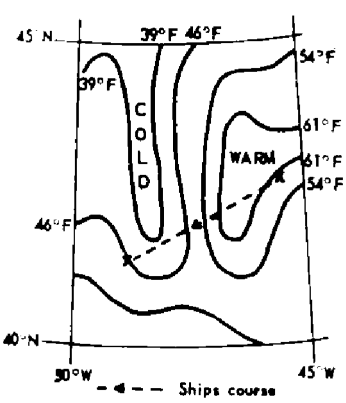
s.s. *Iberia*. Captain R. E. J. Fox. Southampton to Bermuda. Observers, Mr. D. W. Swetman, 1st Officer and Mr. P. Lockyer, 3rd Officer.

15th April 1968. At 1600 GMT the engine room reported a drop in sea temp. of 17 degF in 20 min. The wind at the time was SE'E, force 3. The weather then got progressively more overcast with frequent rain showers, the cloud being 8/8 Fs. At 1725 thick fog descended but cleared at 1753 and severe condensation formed on the inside of the bridge windows. At 1815 the outside of the windows were similarly affected. The following readings were taken, the sea temp. by condenser intake:

TIME (GMT)	DRY (°F)	WET (°F)	SEA (°F)
1200	59	53	60
1600	50	48	46
1700	49	48	43
1800	51	51	47
1900	61	60	61

Position of ship at 1200: 42° 48'N, 45° 31'W.

Note. The *Iberia* was in an area where the Gulf Stream and the Labrador Current meet, with the resulting rapid change in sea temperature. The 5-day mean sea-surface temperature chart for the period 15th–19th April (as shown below) indicates the range of temperatures in this area at the time.



The synoptic chart for 1200 GMT on the 15th shows a depression over Bermuda with a warm front extending ESE from Sable Island. The temperature readings would suggest that the ship passed through the warm front between 1800 and 1900.

DISCOLOURED WATER

South African waters

m.v. *British Oak*. Captain D. G. Buckley. Bandar Ma'shūr to Lobito (West Africa). Observers, the Master and Mr. J. S. Luker, 2nd Officer.

8th May 1968. At about 1120 GMT several bright-red patches were observed on the water ahead of the ship. When the vessel passed through the area of discolouration it first appeared like dust. Samples were taken, using the rubber bucket. On examination it was seen that the water was laden with thousands of tiny cells. The cells were at most 1 mm in size and each had a small white body in the centre.

After the water sample had settled the majority of the cells floated on the surface. giving it a definite reddish tinge. The concentration of cells on the sea surface must have been very great to give it such a brilliant red colour. The patches were quite extensive, covering perhaps 2 to 3 miles. Air temp. 64·8°F, wet bulb 62·5°, sea temp. 68·3°. Wind variable, force 1.

Position of ship: 34° 35′S, 22° 36′E.

Note. Dr. T. J. Hart of the National Institute of Oceanography comments:

"The discolouration observed by the *British Oak* was almost certainly a bloom of the (relatively) large dinoflagellate *Noctiluca miliaris*. Other causes of similar discolouration, notably ciliate protozoa, are known from that area, but the excellent verbal description seems most convincing."

SUBMARINE EARTHQUAKE

Mutsure anchorage, Honshū

m.v. *Duhallow*. Captain W. H. Whitaker. At anchor. Observers, the Master, Mr. M. Tregoning, 3rd Officer, J. Dewa, Quartermaster and members of the crew.

1st April 1968. At about 0040 GMT the vessel was felt to tremble rhythmically but not violently. At first it seemed as though two large generators had been started but the vibrations continued for about 6 min. Similar vibrations were felt the previous night but were less pronounced and, at the time, it was not realized what they were.

Position of ship: 33° 59′N, 130° 53′E.

Note. Mr. J. P. Piegza, Seismologist at Kew Observatory, comments:

"The experiences of the *Duhallow* were due to a very large earthquake of the magnitude 7½ which occurred on 1st April 1968 at 00h 42m 04s GMT at 32° 30′N, 132° 12′E. Due to the considerable distance (over 200 km) from the ship and the much longer waves which predominate at this distance, the vibrations were not violent. The vibration lasted for about 6 minutes, just as would be expected for an earthquake of this magnitude and this distance from the ship."

BIRDS

South Pacific

m.v. *Essex*. Captain H. C. R. Dell. Balboa to Brisbane. Observers, the Master, Mr. R. E. H. Hughes, 3rd Officer, other officers and crew.

13th June 1968. At 2000 GMT a bird, believed to be a Wandering Albatross, was observed. It had a wing span of 6–8 ft, white face and neck, dark-brown crown of head (possibly the mottled brown of a young albatross), pinkish beak and feet, dark-brown upper side of wings, back and wing roots white, underside of tail dark-brown or grey, underside of body and wings white except for dark-coloured wing tips and leading edges of the wings. The bird was soon joined by 2 or 3 similar birds and they have been following the ship each day. A Tropic-bird and several larger dark-brown Petrels were also observed. It is noted that the albatross has never been seen so far into the tropics before, usually not in a temperature over 70°F except near the Galápagos. Air temp. 76°F, sea 80°. Wind SE'S, force 4. Partly cloudy.

Position of ship: 20° 45′S, 167° 50′W.

CRAB

Indian Ocean

s.s. *Caltex Canberra*. Captain A. W. Sarginson. Bandar Ma'shūr to Yokohama. Observers, Mr. P. W. Foot, Chief Officer, Mr. A. G. Shaw, Navigating Apprentice.

11th May 1968. At 1140 GMT the vessel was stopped. A small grey-brown crab, 1 inch in diameter, was observed close to the ship. The crab was attacking a cuttle-bone by making lunges at it from a distance of about 1 ft. A few minutes later the crab attached itself to the bone and worked its way around with its claws. The ship was 85 miles off the west coast of Ceylon.

Position of ship: 06° 20′N, 78° 33′E.

RAYS

South Atlantic Ocean

m.v. *Adventurer*. Captain R. H. K. Ledger. Lobito to Port Elizabeth. Observers, Mr. F. Martin, 2nd Officer, Mr. T. M. Fitzpatrick, 3rd Officer and Mr. M. Donaldson, Radio Officer.

7th May 1968. Between 0930 and 1130 GMT and latitudes 14° 53′S and 15° 29′S, steering 198° 12 miles off the coast of Angola, numerous Ray fish were sighted. They ranged in size from 3 to 4 ft in width and 12 to 15 ft in length, the larger ones being the more numerous. Although no count was taken, it was estimated to be in excess of 100 sighted within 2 hours. They were mostly on or near the surface and close enough to be covered by the ship's wash. The nearness of the ship seemed to cause them little or no alarm. Air temp. 72°F, sea 73°. Wind, light variable. Calm sea, low swell. Occasional Rays were also sighted up to 20 miles north and south of the given latitudes.

It is of interest to note that the sea temp. dropped 10 degF in the following 6 hours.

Position of ship at 1200: 15° 36′S, 11° 42′E.

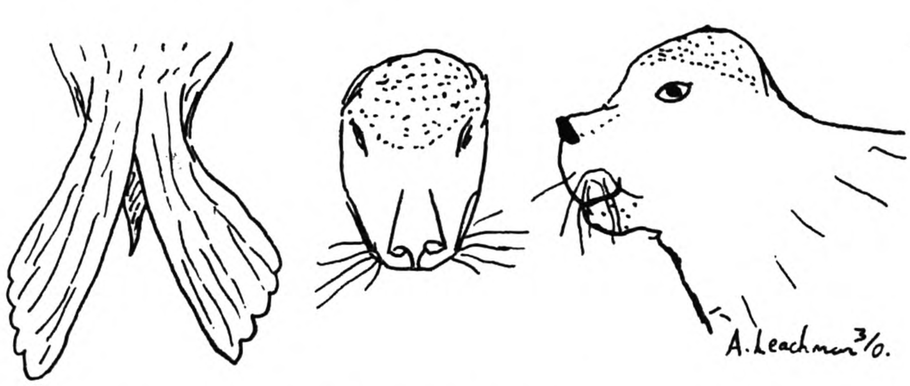
SEAL

South Atlantic Ocean

m.v. *Westmorland*. Captain D. E. Moran. Cape Town to Hobart. Observer, Mr. A. Leachman, 3rd Officer.

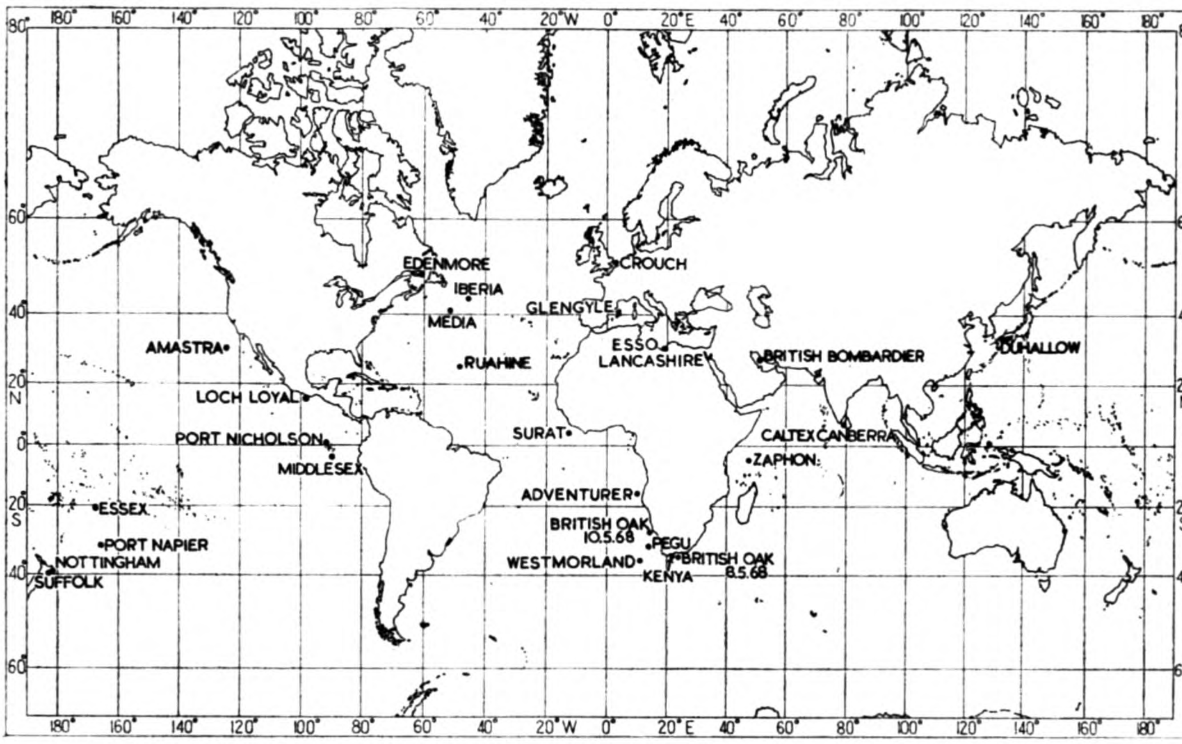
7th May 1968. At 1806 GMT a large seal-like creature was observed on the port bow. It was approx. 9 ft long, dark grey in colour with cream spots on the crown of its head. Tail flippers and a small tail were observed but no side flippers were seen. As this creature surfaced, vapour was exhaled from its large, unusual nostrils. The nostrils of the animal appeared to rise about 3 inches when it initially broke surface.

Position of ship: 34° 58′S, 10° 25′E.



Note. Miss J. E. King of the Natural History Museum comments:

"Although fur seals would have been the animals expected in the Cape Town area, these would have looked black in the water. The grey colour of the seal seen and the prominence of its nostrils suggests that the animal may have been a young elephant seal (*Mirounga leonina*). Elephant seals are normally resident on many of the Subantarctic islands; there is a breeding colony on Gough Island and it was probably a wandering immature animal from this colony that was seen."



Positions of ships whose reports appear in "*The Marine Observers' Log*".

MARINE LIFE

off S.W. Africa

m.v. *British Oak*. Captain D. G. Buckley, Bandar Ma'shūr to Lobito. Observers, Mr. J. S. Luker, 2nd Officer and Mr. R. D. Peddle, 3rd Officer.

10th May 1968. Shortly after 0900 GMT numerous whales were observed off the starboard bow. Most of them seemed to be heading in a s'ly direction but this was not general. Many spouts were seen but, due to the large number, it was impossible to follow individual whales. By 0915 whales were to port and also ahead of the vessel but none came close enough for identification to be made. Numbers were estimated to be between 50 and 100. A smell, usually associated with seaweed, was extremely strong for about 20 min. There were also many seals present and these seemed to gather in groups playing round one or more of the whales. Several different species of birds were observed following the general track of the whales. Sea temp. 62°F. Wind E'ly, force 1.

Position of ship: 28° 24'S, 15° 15'E.

PHOSPHORESCENT WHEELS

Persian Gulf

s.s. *British Bombardier*. Captain A. C. Brown. Kharg Island to Cape Town. Observer, Mr. A. C. Burns, 3rd Officer.

23rd April 1968. At 1650 GMT on a moonless, cloudy night, phosphorescence in the shape of large cartwheels with S-shaped spokes was observed revolving both clockwise and anticlockwise from various centres. Later, before dying out, they appeared to be approaching the ship from an 080° direction in a straight line, giving the impression of a line of breakers at 3 sec intervals. There was no phosphorescence in the wake at the time of the observation and no signal showing on radar from this phenomenon. There was 6/8 cloud cover. Wind variable, force 2. Sea slight and lightning but no thunder.

Position of ship: 27° 29'N, 51° 37'E.

LUMINESCENCE

South Atlantic Ocean

m.v. *Pegu*. Captain J. C. Morris. Dakar to Durban. Observer, Mr. D. M. Lucey, 2nd Officer.

14th April 1968. At 2300 GMT it became necessary to change the log-line which had been in the water since Dakar. The line, which was made of plaited hemp, was badly kinked and during the middle watch an attempt was made to straighten it. On turning the line, numerous small spots of phosphorescence were observed, varying in size from a pin-head to about ⅛ inch square. Rubbing the spots had no effect and they faded out after about 5 sec. Some of the spots were transferred on to the fingers but these quickly faded. Shining a torch on the line produced no effect. These events occurred in the wheelhouse about 1 hr after the line was removed from the water. Air temp. 66°F, wet bulb 64·4°, sea 64°. Sky clear.

Position of ship: 29° 47′S, 14° 04′E.

North Atlantic Ocean

m.v. *Ruahine*. Captain R. G. Hollingdale. London to Willemstad (Curaçao). Observers, the Master and Mr. B. O'Dea, 3rd Officer.

16th–17th April 1968. From 2300 GMT on the 16th for the next few hours some spectacular luminescence was observed. Particularly prevalent were patches of upwelling sub-surface water breaking into vivid luminosity at the surface. Accompanying these were a series of rapid light flashes on the sea surface, leaving patches of milky sea. The first-mentioned phenomenon was remarkable for its frequency and vividness. For the most part the luminescence was a whitish colour but on occasions green upwellings could be seen. There were occasionally circular areas about 15 ft in diameter where the water was brightened by a series of upwellings, some 8 or 9, occurring in rapid succession. It was noticed that the first of these flashes always occurred at that edge of the circle nearest to the ship, others following at a slightly greater distance. At times a distinct bluish effect could be seen. At 0001 on the 17th: Air temp. 73·1°F, wet bulb 71·1°, sea 72·7°. Wind SSE'ly, force 4. Sky overcast.

Position of ship at 2300: 25° 20′N, 48° 23′W.

South Pacific Ocean

m.v. *Middlesex*. Captain W. F. T. Dan. Auckland to Balboa. Observers, Mr. R. Hoare, 3rd Officer, Mr. R. Comrie, Chief Radio Officer, Mr. D. Watson, Extra Deck-hand and Mr. M. Willis, Jnr. Ordinary Seaman.

1st June 1968. At 0415 GMT luminescence was seen in the water disturbed by the ship's bow wave. It appeared as small greenish globules. The Aldis lamp was shone on the luminescence but no effect was noticed. The lamp was then trained on the sea outside the area of the bow wave and small red pinpricks of light began to flash on the surface. This form of luminescence could be stimulated as far as the Aldis beam could reach on both sides of the vessel. The red-glowing organism was very bright and appeared to leap across the surface as if attempting to get rid of the Aldis beam. As soon as the Aldis was switched off the luminescence disappeared. At 0505, shortly after the radar had been switched on, two large patches of luminescence, some 30 ft in diameter, appeared on the port bow at a distance of some 800 yd. The patches maintained a constant green glow and also sparkled with green flashing lights. The radar had no effect on the red luminescence. The echo-sounder produced no stimulation nor recorded any trace to 600 fm. At 0415: Sea temp. 72·5°F. Wind SE'S, force 2–3. Sky overcast. Good visibility.

Position of ship: 3° 35′S, 89° 52′W.

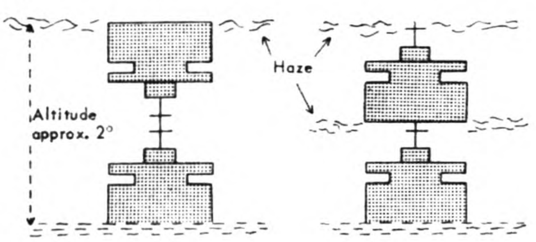
ABNORMAL REFRACTION

Gulf of Sirte

s.s. *Esso Lancashire*. Captain T. Jemison. Fawley to Marsa el-Brέga, Libya. Observer, Mr. P. R. Craythorn, 2nd Officer.

11th May 1968. At 1410 GMT a tanker with all aft accommodation was observed on a reciprocal course bearing 135° at a distance of approx. 15 miles. The tanker was hull down on the horizon and an inverted refracted image of the ship was seen. The superstructure of the mirage and that of the ship were connected. The image was clear and included a bow wave. The altitude of the mirage was approximately 2°. At 1415 there was an effect similar to that of black smoke passing over the refracted image and the image was then seen to appear right way up but still connected to the actual superstructure. The ship was now still in evidence but only the refracted superstructure could be seen. Five minutes later, with the smoke effect still seen, the refracted superstructure blended with the actual superstructure to give a blurred, vertically elongated ship at a distance of about 8 miles. By 1432, with the ship at 6 miles' distance, no refraction was seen as she passed in the opposite direction. Air temp. 78°F, wet bulb 68°, sea 69°. Wind NE'E, force 2. No cloud. Course 133°.

Position of ship: 31° 03'N, 18° 50'E.



Note. This type of refraction occurs when the sea is much colder than the air, so that the temperature in the lowest layer of air increases rapidly with increase in height above the sea. The bending of the rays upwards causes multiple reflections and strange images arise, upright and inverted, varying from one moment to the next, changing in accordance with the distance of the object and the distribution of temperature in the atmosphere.

South African waters

s.s. *Kenya*. Captain I. K. Bowerman. U.K. to East Africa.

23rd May 1968. From 1230 GMT, as the vessel sailed east along the South African coast, freak atmospheric conditions were observed. Ships showing at 15 and 25 miles were becoming inverted while on other occasions the superstructure was grossly exaggerated, masts in particular becoming extended and warped. The radar screen showed a distinct line (not propagated but banked together rigidly) of echoes ahead about 10 to 15 miles. At times this completely encircled the ship and gradually closed in during the evening. (It was again observed for a short time the next morning, around sunrise.)

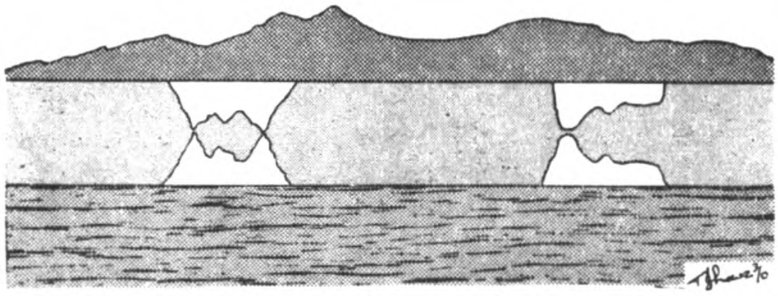
At 2200, Cape St. Francis Light was observed at a distance of 83 miles, appearing like an orange half-sphere on the horizon. This disappeared at 70 miles but was later seen again at 45 miles. At 1800: Air temp. 68·7°F, wet bulb 63°, sea 64·9°. Wind ENE, force 3.

Position of ship at 1800: 34° 42'S, 21° 48'E.

Gulf of St. Lawrence

m.v. *Edenmore*. Captain A. L. Wiles. Seven Isles to Newport (Mon.). Observer, Mr. T. J. Lowe, 3rd Officer.

25th June 1968. Between 1400 and 1500 GMT, whilst approaching Belle Isle



Strait from the west, abnormal refraction was seen. It appeared as a low belt of mist between ship and land and two icebergs were observed at a distance of 8 miles with inverted images above them. At 1445 the horizon away from the land was distorted for a period of about 10 min. It looked as if some quickly-evaporating spirit was on the surface. Air temp. 46°F. Wind, light airs.

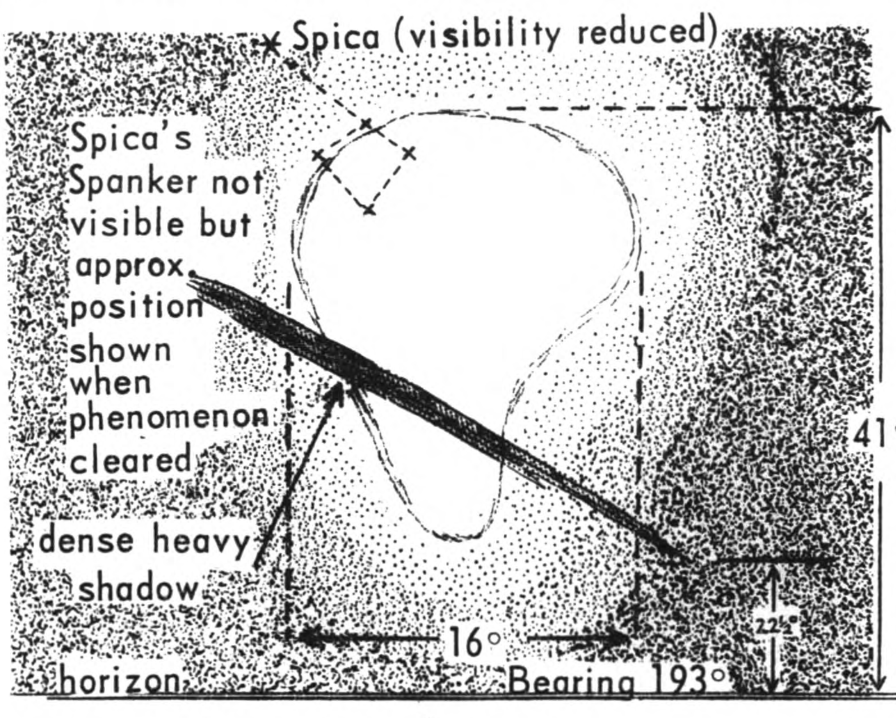
Note. See the Note under the report from the *Esso Lancashire.* The plotted sea-temperature charts for this period indicate that the sea-surface temperature was about 37°F at this time.

ZODIACAL LIGHT

North Pacific Ocean

m.v. *Amastra.* Captain D. H. Mortimer. Yokkaichi to Acajutla (El Salvador). Observers, Mr. T. P. Hughes, 3rd Officer and Mr. E. A. Thomas, A.B.

23rd May 1968. On first sighting at 0650 GMT (1½ hours after twilight), the phenomenon was about half a min from maximum brilliance and, although slightly blurred, a cone shape was apparent. After 3½ min the phenomenon was reduced to a faint glow. The cone shape was well defined and the light shown was pearly and homogeneous, diffusing slightly towards the apex of the cone. A diagonal band of what appeared to be cloud crossed the neck of the cone from NW to SE. On fading, the phenomenon took on its original balloon shape. Neither the moon nor Milky Way was visible at the time and the sky was semi-overcast. The brilliance of the light, which was estimated to be that of a half moon observed through thin cloud, was sufficient to make Spica, lying outside the phenomena, invisible to the naked eye. The only difference from the description in the *Marine Observer's Handbook*



was the position of the phenomenon which was at right angles to its suggested position above the sun.

Position of ship: 30° 28′N, 122° 17′W.

CREPUSCULAR RAYS

South Pacific Ocean

m.v. *Port Napier*. Captain F. M. Barton. Panama to New Zealand. Observer, Mr. R. N. Barnes, 2nd Officer.

22nd April 1968. For about 45 min before sunrise 5 or 6 crepuscular rays were observed radiating from the bearing of the sun in a s'ly direction. Though varying slightly in size, they were visible to an altitude of 10° and stretched for approx. 30° of azimuth. The main centre ray was visible at times to an altitude of 45°. The rays were exceptionally brilliant and, when first observed, were yellow in colour, gradually becoming pink before they vanished. The colours of the spectrum were also visible on the right-hand edges of all the rays, the most visible colour being violet. Air temp. 70°F, wet bulb 66·2°, sea 70·3°. Wind NW, force 3. 3/8 cloud, Cu, Ac and Cs.

Position of ship: 31° 39′S, 163° 04′W.

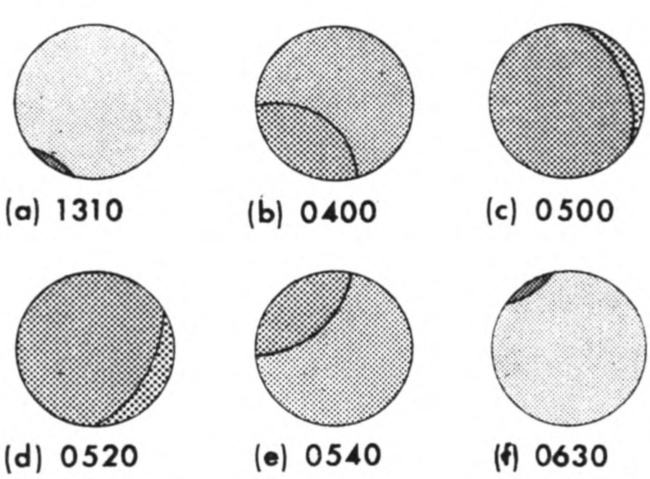
LUNAR ECLIPSE

North Pacific Ocean

m.v. *Loch Loyal*. Captain G. C. W. Meldrum, M.B.E. Los Angeles to Cristobal. Observers, Mr. R. C. Phillips, 3rd Officer and Mr. G. A. Bateman, 4th Officer.

13th April 1968. The lunar eclipse began at 0310 GMT with a slight darkening of the lower left-hand edge. By 0400 the moon was almost half covered, the shadow being a dark mauve while the moon had turned to a light-red colour. Maximum coverage was at 0500, the small crescent of moon showing a deep red. As the shadow crossed the moon the colour began to become a lighter red until, at 0630, the shadow passed off the top left-hand edge of the moon. [The diagrams are adapted from Mr. Bateman's coloured drawings.] The sea was calm and the sky clear.

Position of ship at 0500: 15° 51′N, 99° 01′W.



(a) Eclipse began. (b) Shadow becoming very dark mauve. (c) Deep red crescent. (d) Crescent moving downward. (e) Dark mauve shadow becoming pale red. (f) Final stages.

VOLCANIC ASH

Galápagos Islands

m.v. *Port Nicholson*. Captain L. W. Cady. Panama to Auckland. Observers, the Master, Mr. A. D. Piqué, 3rd Officer and ship's company.

12th June 1968. During the middle watch a low bank of apparent cloud was observed ahead lying in a NW/SE'ly direction. By 0645 GMT sulphurous fumes were noticeable and at 0700 the vessel entered the cloud which turned out to be of fine ash. This was first noticed as a black deposit on the paintwork. Shortly afterwards the visibility had dropped to about 5 miles and was still decreasing. The moon was only faintly visible. By 0830 the moon was obscured and the visibility had further decreased to approximately 500 yd, this being the lowest range observed. After about half an hour visibility began to improve until, by 0915, it was again about 5 miles. The vessel finally emerged from the cloud at 1530 but the sun was still invisible and the sky had a silver-grey metallic hue. The windward side of the vessel was completely enveloped in fine, black volcanic ash and there were thin deposits elsewhere. In some places there were drifts up to 4 inches deep. Air temp. 70·4°F. Wind SE'E, force 2–3. Course 241° at 19½ kt.

Position of ship at 0630: 00° 42'N, 92° 06'W.

Note 1. This observation is one of the most useful reports received of these eruptions since it reveals that the surface and upper wind directions were SE'ly and E'ly respectively. The eruptions were on the island of Fernandina (Narborough), Galápagos, 90 miles south-east of the *Port Nicholson*'s position at 0830 when she experienced the densest ash and about 20 miles east of her 1530 position when the high-level ash cloud still overcast the sky. Reports from the biological station on the islands (Santa Cruz) indicate that the eruptions occurred as distant-island explosions at 0350 and 2300–0000 GMT on 11th June, with further explosions next day at 2200. The ash fall was measurable over an area from 90 km south-east of the volcano to about 300 km west of it, or even further.

Note 2. The observation and samples of dust were forwarded to the Natural History Museum (Department of Geology) and to the Atomic Energy Research Establishment, Harwell. Their analysis of the dust showed a composition typical of an igneous rock, with negligible proportions of radioactive matter:

	%		%		%
Silica	60	Calcium oxide	7	Titanium dioxide	3
Alumina	10	Magnesium oxide	5	Potassium oxide	0·5
Ferric oxide	10	Sodium oxide	3	Other elements	traces

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Below is a summary of the auroral reports for the period April–June 1968 received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh from British ships. As usual, these were, from the point of view of auroral observing, three quiet months, with so few hours of darkness. An observer in *Weather Adviser* on 2nd May at latitude 62°N records that the aurora visible appeared to represent a coronal display in the zenith, but that only the part to the south of the zenith was discernible because of the light sky at 0050h.

"Geomagnetic activity reached a high level on 5th–6th April, 7th May and 10th–13th June. Few positive observations were charted for the May and June periods, but on 5th–6th April, during a short burst of activity around 2200h, aurora was overhead and showing red colouration in southern Scotland, and observers in m.v. *Glitra* and m.v. *Fidra* at the same geomagnetic latitude off southern Norway confirmed the extension of the display eastwards while to westwards it was reported by observers in *Weather Observer*.

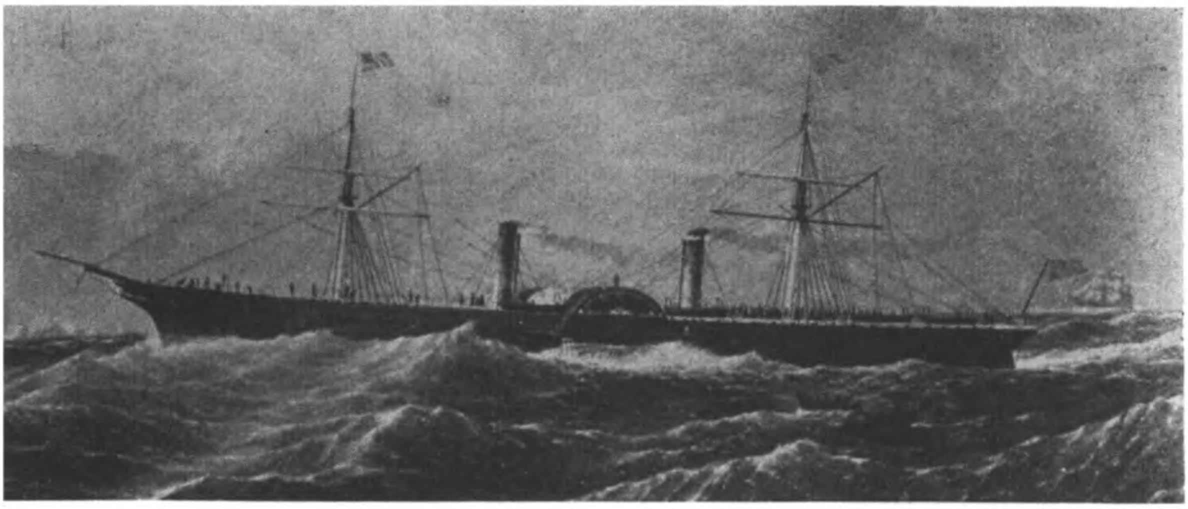
"We gratefully acknowledge from observers in m.v. *Glitra* also a noctilucent cloud report for 24th July 1968. These clouds are becoming increasingly familiar to many land observers, but reports from observers in ships are still rare. It was interesting to receive here from a Danish observer a Christmas card containing an excellent colour photograph of the clouds on this same night.

"Our good wishes and grateful thanks to all who are concerned in helping us."

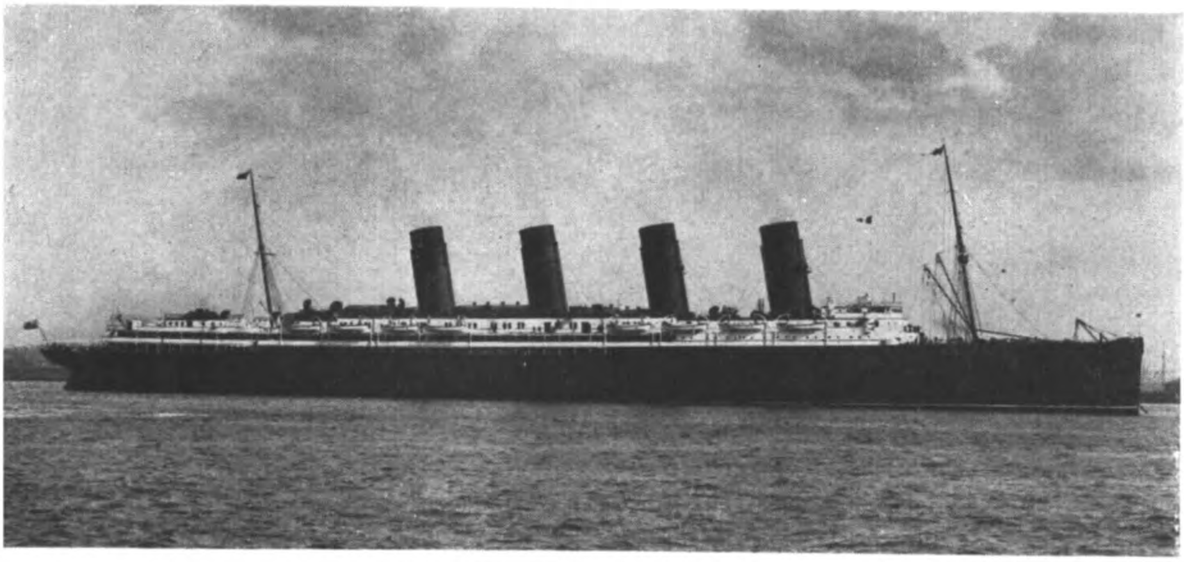
Date (1968)	Ship	Geographic Position	Λ	Φ	I	Time (GMT)	Forms
28th Feb.	*Scythia*	52°05′N 35°30′W	040	61	+71	2200–0500	R, N
5th Apr.	*Fidra*	59°30′N 10°35′E	100	59	+72	2100–2245	HA, RB, RR, P, N
	Glitra	57°50′N 07°00′E	100	59	+71	2144–2245	RB, RR, P, N
	Weather Adviser	52°11′N 20°23′W	060	59	+69	2200	RB
20th	*Weather Monitor*	52°22′N 19°39′W	060	59	+69	2320	N
2nd May	*Weather Adviser*	62°04′N 32°35′W	060	70	+76	0050	RR
3rd	*Weather Adviser*	62°04′N 32°35′W	060	70	+76	0050	P
7th	*Dukesgarth*	50°00′N 66°00′W	360	62	+76	0500–0600	RA, RB
10th	*Weather Adviser*	62°03′N 33°04′W	060	70	+76	0355	N
16th	*Weather Adviser*	61°58′N 33°04′W	060	70	+76	0252	RB
18th	*Toronto City*	48°40′N 62°20′W	010	60	+74	0230–0308	HA, RA, RR, P
1st June	*Sagamore*	50°00′N 67°00′W	360	62	+76	0300–0600	HA, RR

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = patch; V = veil; N = unidentified auroral form.

(Opposite page 72)



Scotia



Lusitania

Photos by courtesy of the Cunard Line Ltd.

Queen Elizabeth 2

THREE SHIPS OWNED BY THE CUNARD LINE LTD. (*see* page 84).

(Opposite page 73)

The radio receiving room aboard Ocean Weather Ship *Weather Surveyor*, drawn by Grenville Cottingham (*see* page 73).

551.507.22:75

Artists of the Weather Ships

By Grenville Cottingham

(From the summer of 1966 until the autumn of 1968 Mr. Cottingham was employed by the Seafarers' Education Service and College of the Sea as an itinerant art tutor working in merchant ships. During this period he travelled 150,000 miles in seventeen merchant ships, talking about art and teaching painting and drawing to seafarers. He is now on the staff of the Sir John Cass College of Art, London.)

"Art class, foredeck, 1400 hours, weather permitting."

This is not, perhaps, one of the most likely notices to be found displayed in the messroom aboard an ocean weather ship, and yet weather ships have been only one type of vessel that have contributed over the past two years to an unique experiment in adult education—the experiment of sending an art teacher to sea with a view to encouraging an interest in art among seafarers.

Realising that many seafarers paint, draw, carve and build models in their spare time but, owing to the nature of their calling, are denied practical help, the Seafarers Education Service began in the summer of 1966 to employ a qualified art teacher to work aboard a variety of ships with the object of organizing classes in art, giving talks on art, and helping individual seafarers to make a start or enhance their skills in these directions. In my two years in this unique post I voyaged in liners, cargo ships, ore-carriers, tankers and two weather ships, *Weather Surveyor* (to Station 'Alpha' in August, 1967) and *Weather Monitor* (to Station 'Juliett' in July, 1968).

The role of the weather ships, too, is unique. A whole month may pass without a glimpse of another vessel, a month in which the sole link with the outside world may be by radio. In this small and confined space the daily working routine of the ship is dominant, and this routine varies little from one day to the next once station duties begin. Every day and all day one sees the same faces, the same places, the same alleyways. In these circumstances it is natural that men should seek ways of relieving boredom and escaping to the pleasures that the mind can provide. Reading kindles the imagination of some; films are a partial relief for others; but, however much benefit and temporary release these pastimes may bring, they do not involve one of man's strongest desires—the desire to create something by way of his own skill and knowledge. Music, writing, painting: all these can provide a solution, and the environment aboard a weather ship would appear ideally suited to promoting self-expression in creative activity. But there are problems facing an art tutor.

First, the tutor arrives quite unknown. He is supernumerary, an extra body exempt from the normal shipboard duties, holding neither the rank of an officer nor the position of a member of the crew. It will not be surprising, therefore, that in his first days on board he is likely to be regarded as something of a curiosity, an outsider. Secondly, not everyone at sea takes easily to accepting activities such as art and painting. Some even ridicule them as 'unmanly' and foreign to the tradition of the sea. Nevertheless, most are curious, particularly when they come to understand that the artist is an expert in his own field and is being paid to help contribute to the process of recreation at sea. The tutor's work may even be seen as akin to that of an entertainer, his audience wanting primarily the pleasure that he can give from what he can show, only some of them achieving pleasure from their own endeavours. The attitudes of the blasé must not be allowed to curb the enthusiasm of those who are prepared to have a try.

It was upon this basis that the classes began and made progress. My first days were spent in exploring the ship, meeting members of the crew on and off duty, and making myself known and familiar. Once the ship had reached station and the relief made, I was able to plan classes as part of the daily routine.

I carried an adequate supply of materials for all comers, and on both my voyages in weather ships the initial response was encouraging, with a class of some nine or ten members of crew attending at regular times. From this original number, classes of six or seven were still with me on completion of these voyages, the ship's complement in each case being 57. Petty officers, meteorologists, radar and radio personnel all participated, but the interest shown by ships' officers was less than in other types of vessel. Practically all my students were beginners, having had little or no experience since their schooldays. Classes were held daily between 2.30 and 4.30 p.m. and again between 6.30 and 10.00 p.m., with the exception of Sundays. When weather permitted, classes were held out of doors on the foredeck (on one occasion the balloon shed became a temporary shelter). Otherwise the petty officers' messroom functioned as the main working studio. Limited space and cramped accommodation are an obvious drawback to this kind of work, in weather ships particularly for they were not designed for the holding of art classes. The tutor must needs be adaptable in using the available space. During my time on Station 'Juliett' we were fortunate in experiencing exceptionally calm weather and the majority of classes could be held on deck.

In addition to the regular art classes, a series of film and slide talks were arranged during our time at sea. These attracted larger audiences and successfully stimulated comment and discussion afterwards.

I have made no reference so far to the tutor's own abilities as an artist and how far these can help the success of his work on board. It is widely believed that the artist lives in a world of his own and only with difficulty makes contact with the layman. I have tried to combat this feeling by leaving behind in each ship some piece of work in which I have tried to draw layman and artist together. In the weather ships I was fortunate in being asked to paint murals to decorate the petty officers' and seamen's messrooms. These murals were, I think, appreciated and did something to liven up the accommodation.

It would be wrong, of course, to give the impression that these ships were without facilities of other kinds or that until I joined them no one used their spare time creatively. Reading was particularly popular, and photography attracted many men. There is a photographic club conducting competitions and with apparatus for developing and printing photographs. Closely linked with photography is the study of ornithology. This is normally the interest of one of the ship's meteorological assistants who keeps accurate records of the birds he has seen, this information being sent to a variety of wild-life societies. Musical instruments are fairly common, one boatswain I met being an exceptionally competent player of the piano accordion. While he was conducting the Gay Gordons aboard one ship, his opposite number aboard the other was probably sitting in his cabin surrounded by glass bottles and skilfully inserting into one of them the intricate network of rigging on his latest barquentine. I hope, however, that I proved able to contribute something to the life of these ships that was also worthwhile.

My travels on behalf of the Seafarers Education Service were generously financed by the Carnegie (United Kingdom) Trust. The Trust is happy to launch interesting and potentially useful experiments but cannot go on providing money indefinitely. My successor is only half-financed by the Trust and the Seafarers Education Service has to find the rest of the money. In a year's time the Trust's grant will come to an end. The Seafarers Education Service would like to continue sending an artist to sea and this work will be the main object of an appeal it will make this year to celebrate its Golden Jubilee. I hope that those who met me in the weather ships will consider it a worthy cause.

Editor's note. The murals which Mr. Cottingham painted in the mess rooms are very attractive. One of his pencil sketches is reproduced opposite page 73. Several members of the ship's company aboard both ships have kept up the art work which he instituted.

551.5:551.465.553:797.14(727)

Acapulco '68*

BY D. M. HOUGHTON
(Meteorological Office, Bracknell)

Acapulco '68 saw an interesting and satisfactory experiment in weather forecasting. It was probably unique in the history of yachting for a meteorologist to accompany an Olympic Yachting Team. Little was known about the stretch of coast off which the Team would be sailing, nor of its winds and currents. The competitors could not be expected to unravel the winds nor discover the secrets of the currents—they would be too busy tuning their boats. In any case, to undertake such a task requires a knowledge of what to look for and some physical understanding of the behaviour of the atmosphere, and it was an honour to be asked to join the Team as their meteorological adviser.

The climatologists had already predicted light winds for the Yachting Olympics; a forecast which appeared justified by the experience of those who visited Acapulco in October 1967 for the pre-Olympic regatta. But, at best, information on Acapulco winds was very scanty and most of the available data were based on records from the Mexican Naval Base, inside the harbour, which is so well sheltered from almost every wind that one would hesitate to use its observations as an indication of the winds to be met on the Olympic race area which lies outside the harbour (see Fig. 1).

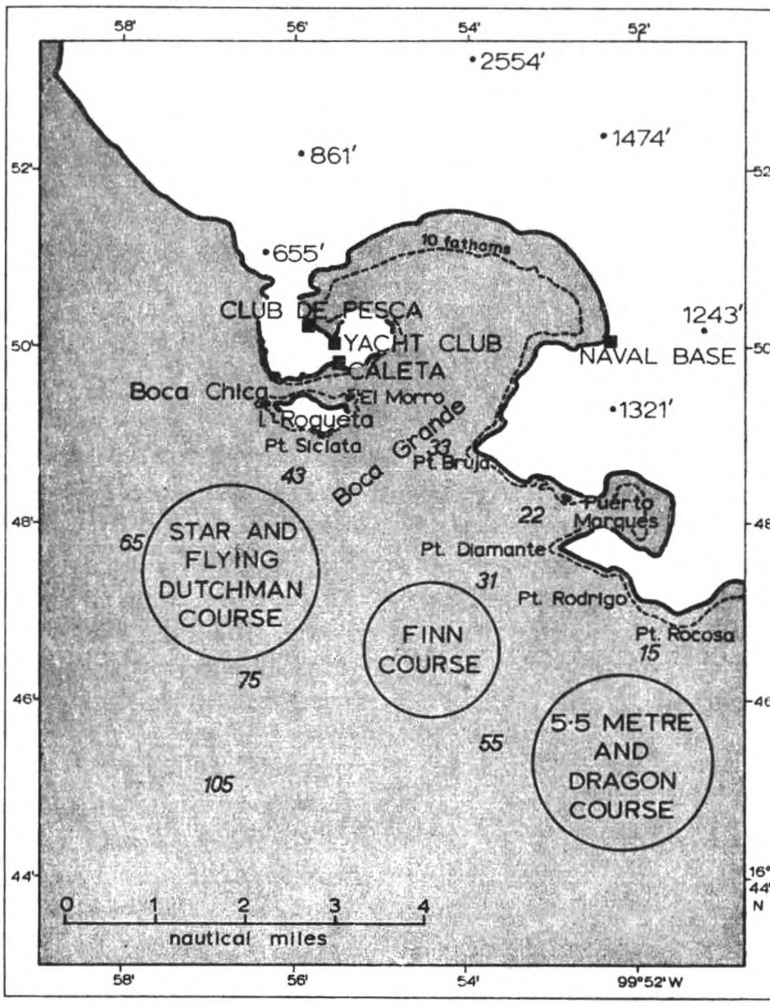


Fig. 1. Chart of Acapulco Harbour showing the positions of the three Courses and places referred to in the text. The 'race area' is a rectangle enclosing all three Courses.

* This article has been adapted from a longer article in *Weather*, January 1969, with the kind permission of the Editor.

The town of Acapulco lies around the walls of an extinct volcano. A large gap in one wall allows the sea to enter the old crater to form a natural deep-water anchorage, the best for some hundreds of miles. A 3,300-foot mountain rises behind the town to the north-east. This mountain and the now irregular walls of the old volcano circling the harbour are the only large physical features for some distance and rise almost solitary in a fairly broad coastal plain which extends some 100 miles or more along the coast in both directions. The plain to the south-east is up to 30 miles in width. Behind the plain the mountains of the Sierra Madre del Sur rise to between 9,000 and 12,000 feet.

Equipment and preparation

I flew to Acapulco on 23rd September and commenced a programme of weather observations without delay. There were only 18 days before racing began. The observations had to be as comprehensive as possible and one could not be sure initially what would be the most vital pieces in the jigsaw of the local weather pattern. My equipment was simple, robust and designed for a single-handed operation. Hydrogen for balloon filling and spars for ocean current work were obtained locally, but everything else had been shipped from Britain with the boats, most of it on loan from the Meteorological Office. A theodolite was mounted on the roof of my hotel and used daily to track balloons up to about 4,000 feet and so find the winds above the levels disturbed by hills and tall buildings. An open-scale barograph and a Racal 217 communications receiver were installed in my room. This receiver was capable of picking up any available weather information on scheduled meteorological transmissions.

The detailed behaviour of the winds over the race area could be studied only by direct observation, and up to six hours a day were spent at sea following the winds and currents on each of the three Courses. An 8-foot rubber dinghy was available for this work but it was not a sufficiently stable observing platform for accurate wind measurement and the drive to and from the race area was very rough on any equipment carried. Fortunately, a 6-ton launch was often available and she was ideal for the job.

Probably the most important item of equipment was a sensitive and accurately-balanced wind vane, built in the Meteorological Office, which gave a direction reading on a magnetic compass. It was very simple in construction, could be mounted anywhere and was designed to carry a small cup anemometer which was held into wind on the vane. The balancing of the vane was very important; if only slightly out of balance it would respond to all the rolling and pitching movements of the boat. Observations of wind direction and speed over the race area were logged every few minutes and low-lift balloons were released at half-hourly intervals. A bearing on the balloon from the point of release showed immediately the surface wind direction and whether this changed significantly with height. Up to ten hydrogen-filled balloons could be taken to sea at a time and a large mattress cover made a useful container for them. If wetted it was heavy enough to keep them under control.

Ideally one would have liked to use equipment giving continuous recording of wind speed and direction, but this was out of the question. One thing which was demonstrated at Acapulco was that a single observer with the simplest of equipment can discover enough about the winds over a local area to provide a great deal of useful information for a yachting team.

Synoptic information

No source of information was neglected. The Mexican Meteorological Service had a team of forecasters in the Acapulco Yacht Club. They received data on a teleprinter link with San Francisco via Mexico City and prepared twice-daily surface and upper air charts covering the whole of North and Central America. Unfortunately the information available over the south of Mexico and adjacent sea areas was very scanty. Even observations from Acapulco Airport were infrequent and sporadic, and there was no other observing station for 150 miles. However, it was usually possible to make a very rough judgement as to the overall pressure pattern which gave an all-important clue to the likely local wind direction off shore. The weather situation was discussed with the local forecasters each morning before the 0915 Team briefing.

Copies of APT satellite pictures of the Mexico area, from Mexico City, and satellite mosaics of the overall cloud pattern, from Bracknell, were received by post and provided useful information despite the time-lag.

Acapulco weather

Before discussing the local wind variations at Acapulco let us look in a general way at the weather which we experienced during the three weeks up to the first day of racing on 14th October, and during the races themselves. The British Team arrived just as the wet season ended. The typical night minimum temperature this first week was 28°C with a dew-point near 27°C. Daylight hours were mostly hot and sunny though for two or three hours just after sunrise there was frequently at least half cover of high and medium cloud. Over the whole period the most frequent wind direction experienced in the afternoon was between south-west and west-north-west for 17 days out of a total of 27.

The Inter-tropical Convergence Zone was rarely more than about 500 miles away to the south and sometimes came as close as 250 miles to Acapulco. Small tropical depressions developed in the ITCZ in about the same longitude as Acapulco and usually moved away on a north-westerly track almost parallel to the coast. Some tended to close the coast while others turned seaward. Their approach was always taken seriously by the local forecasters since every 20 or 30 years one of them hits the area with hurricane intensity. Two tropical depressions, 'Pauline' and 'Rebecca', passed within 150 miles of Acapulco while we were there and brought three or four days of easterly winds in each case. Their subsequent development showed that they were a potential hazard, but their maximum winds when at 17°N were only about 30 to 40 knots (these were winds estimated from satellite pictures and broadcast on advisory messages by San Francisco Weather Bureau). 'Rebecca' brought a very wet weekend. A shallow depression formed at the same time over the Acapulco area, probably in association with a shallow trough in the easterly upper winds, and gave an estimated 10 inches of rain on 6th and 7th October.

There were signs on the third and fourth race days (16th and 17th October) of another disturbance being thrown northwards off the ITCZ, then 250 miles away, but fortunately this one quickly dissipated.

Westerly winds were dominant throughout the final week. An anticyclone to the north and north-west helped to give unusually strong winds for the first two races—up to 18 knots on the second day. Immediately the racing was over we had two days of cloudy, still weather with hardly a breath of wind so perhaps after all there was some justification for the prophecies of very light winds.

The local winds

The main questions which had to be answered about the behaviour of the winds over the race area may be summarized as follows:

(*a*) How did they vary during the day?
(*b*) What were the typical antecedents of any particular mode of diurnal variation?
(*c*) Was there any pattern to the gusts and lulls?
(*d*) Did the direction and speed vary significantly over the Courses?

The races were scheduled for the afternoon period commencing at 1300 and, given sufficient wind, lasting about 3 hours. Observations covering this period were therefore very important and on most days before 14th October it was possible to undertake a full programme of wind observations from about 1200 to 1700. Every day's observations made the picture more complete. Each forenoon was fully occupied starting with the pilot-balloon ascent, then the search for synoptic information, the discussion with the local forecasters, preparation of the forecast and the Team briefing.

Gusts and lulls

One of the first things which was noticed was that the gusts were not veered and lulls were not backed from the mean wind as they are in British waters. The gusts came in from the same direction as the mean surface wind or from up to about 10 degrees either side of it. There were wind shifts of some 20 degrees over periods of 10 to 20 minutes in which the gusts would often anticipate the longer period change in direction. Sometimes a 'header' on port or starboard tack, but particularly on starboard (when the wind backs), would commence with a lull and the wind would drop too light for the larger boats to tack without serious loss of speed. We learned, however, to look for a recovery of wind speed from the new direction within 2 or 3 minutes when a tack could be made with advantage.

The half-hourly low-lift balloon observations over the sea showed that the wind sometimes veered and sometimes backed with height and sometimes the direction did not change, at least not up to about 1,000 feet. This accorded with the observations of the behaviour of the gusts at the surface, since gusts are normally the result of turbulence which brings the air above the friction layer down to the surface. The twice-daily meeting with the Team provided opportunity for the discussion of why the wind should behave differently in the tropics and, given a background understanding of what was happening, the British Team was in a much better position to make decisions at each wind shift during the races than they would otherwise have been.

The sea breeze

It was found that, on the whole, the sea-breeze effect was small and that on the majority of occasions a much larger land-breeze effect was dominant. Fortunately there were two days before the racing when there was no wind at all other than a local sea breeze so that this could be isolated. The sea breeze set in directly onshore at about mid-day, veered slowly through about 40 degrees, increased to 5 knots and then died away soon after 1500. It was considerably weaker than on a summer's day in British coastal waters because, although the land temperature might rise to well over 32°C (90°F), the sea itself was very warm with a surface temperature as high as 31°C. Consequently the difference between land and sea temperature was never very great. In fact the early morning breeze was often the stronger, when the land temperature was down to about 23°C and contrasted with a sea temperature some 8 degC higher.

Easterly winds

The early morning land breeze was from the north-east and the pilot-balloon ascent at 0700 showed it extending upwards to about 800 to 1,200 feet. When the wind higher up was from a mainly westerly direction a westerly wind generally set in over the race area by the afternoon. There were, however, three occasions when the wind was light easterly (4 to 8 knots) all the way up to 4,000 feet and the sea-breeze effect caused a swing to southerly by the afternoon. Strong easterlies (15 to 30 knots) up to 4,000 feet were observed with the proximity of tropical depressions to the south, when surface winds remained easterly throughout the day.

Westerly winds

The sea breeze is, by definition, a local very shallow phenomenon in which the air over the land rises only a few thousand feet, then returns out to sea at this level and subsides off shore to complete the circulation. Our observations off the Mexican coast suggested the development of a much larger circulation such as is often found with potentially unstable air over a large land mass, especially in the tropics. When the air over central Mexico was unstable it rose, probably 20,000 feet or more in towering cumulonimbus clouds, creating a broad but shallow low pressure area over land which was capable of giving winds of up to 15 knots at the surface. These winds were steered to some extent by the high ground and blew over the race area from between south-west and west-north-west.

The only way we could judge what was happening inland was by observing the development of cloud during the day. It was soon noticed that the wind direction and strength along the coast on a westerly day was dependent on the intensity of convective cloud development well inland. One of the best westerly winds coincided with the development of severe storms over Mexico City, when flooded tracks were seen on television sets at home. There was normally a veer of from 40 to 60 degrees as the convection developed and the wind increased. This veer often occurred in two stages, the first before 1300 and the second at about 1500, with a fairly constant wind between. The daily discussions with the Team trained them to recognize for themselves such associations between wind change and cloud development.

Topographical effects

Observations from a large number of positions on the three Courses showed that there was a perceptible bending of the wind to the land, particularly on the 5·5-metre and Dragon Course where a change of 10 degrees was observed either side of Punta Rocosa in winds blowing along the coast. The Courses were 2 miles in diameter and there was often a significant difference in wind speed between the inshore and seaward edges of the Courses. On days of very light winds when the sea breeze was dominant the strongest wind was found out to sea as the breeze was setting in (1200 to 1400 hours), but from about 1500 hours the strongest wind was inshore with the breeze dying rapidly out to sea. Stronger westerly or easterly winds blowing along the coast were almost invariably strongest out to sea throughout the afternoon.

Ocean currents

The sea in the race area had a reputation for producing fickle and rapidly varying currents. Crews in the 1967 pre-Olympic regatta had reported being thwarted at the windward mark by suddenly finding a wind-driven current of over 1 knot after starting with little or no current.

A permanent feature was the long, low swell generated over some 6,000 miles of the Pacific Ocean to the south-west. The height of this swell varied from day to day from as low as about 3 or 4 feet to as high as 8 or 9 feet and the length was of the order of 100 yards. It was an irritation to the helmsmen, particularly in light winds, and it made observation of the marks difficult.

There is very little tide on the Pacific coast of Mexico, a rise and fall of only 1 or 2 feet, and in the deep coastal waters the tidal currents are very weak. The Admiralty *Pilot* notes a general ocean current of about ½ knot running south-east along the coast before recurving westward into the North Equatorial Current.

The very high sea-surface temperature is a probable clue to the apparently unpredictable behaviour of the sea surface. A temperature as high as 31°C suggests the presence of a steep temperature gradient and therefore density gradient not far below the surface. A strong density gradient suppresses turbulence and smooth laminar flow results. The water above the strong thermocline is then able to slide over the water below with a minimum of friction. Dr. J. Woods, describing his experiments on this type of sea surface in the relatively warm waters off Malta[1], used the word 'slippery' to describe this warm-water phenomenon, a description which proved even more applicable to the behaviour of the much warmer waters at Acapulco.

Observing the surface currents

With two British Team helpers it was possible to make daily measurements of the surface water movement on all three Courses. Our equipment was very simple: free-floating weighted spars, a sealed plastic can, 80 fathoms of nylon fishing line on a reel with a lead sinker, an Admiralty chart and a hand-bearing compass. The spars were designed to float upright through the top 42 inches of the sea, the layer in which the boats sail, with some 6 to 9 inches above the surface painted yellow to aid visibility. From a fixed point, marked either by the plastic can or good transit fixes, the spar was floated and a bearing on its movement gave the direction of the surface current. The speed of the current was estimated from a rough measurement of the distance covered by the spar in 20 to 30 minutes based on land bearings or the time taken to cover the distance in the rubber dinghy. A rough estimate of the speed of the current was all that was necessary. It was the relative bearing of the current which was most important. Readings of the sea surface temperature were also made.

For the first two weeks the sea surface with a temperature of about 30° to 31°C behaved just like the slippery layer mentioned earlier. In fact it was almost too good to be true. The sea-surface water moved almost directly downwind at speeds of up to about 2 knots, depending on how long the wind had been blowing from that particular direction. When the wind dropped to a calm the water continued in the same direction with little change in speed and it took a wind from the opposite direction from 24 to 36 hours to stop the water and get it moving the other way. There was no evidence of the Ekman spiral whereby the direction of movement of deep wind-driven currents is at a fairly large angle to the wind. In other ways, too, the sea surface behaved as though it was shallow water with little friction beneath. Particularly noticeable was the often rather confused short swell which seemed to persist long after the wind had died away and was most irritating to the helmsmen. When the wind direction reversed there was a very uncomfortable short steep sea until the water got going with the wind. With a westerly wind the surface water movement appeared to be influenced by the deeper south-eastward current and the maximum water speed was observed over the shelf off Punta Rocosa where the depth decreased to about 15 fathoms. Strong eddies also developed off Isla de la Roqueta and Puntas Rodrigo and Rocosa and spread outwards to within half a mile of the race area with reverse currents of up to 2 knots.

On the 6th and 7th October winds of up to 30 knots, associated with a tropical depression, mixed the sea-surface water and the temperature dropped to about 28°C. The sea surface ceased to behave as though it was slippery and from 9th to 16th October currents of about ½ knot were observed running at an angle of up to 90 degrees off the wind. It began to look as though we would not be seeing any more good slippery-type surface currents. However, on 17th October, the fourth day of racing, a wide slick of light-green water was found off Punta Diamante stretching away south-eastwards along the coast. This obviously had a large fresh water content and appeared to have originated from the area of two river estuaries, 20 and 40 miles south-east from Acapulco. The temperature of this water was 31°C and with its low salinity there must have been a very steep density gradient where it joined the main ocean water. It lay in a very shallow layer and the dark-blue water beneath was brought to the surface when disturbed by the larger launches. Where the light-green water met the dark-blue water on the surface the temperature changed by 2 degC in a few feet. Subsequently the light-green water spread north-westwards along the coast to beyond Isla de la Roqueta, and seawards to cover the inshore half of the race area.

The presence of this slippery layer on the inshore part of the race area meant that crews experienced completely different and sometimes opposing currents at the start and windward marks. Although precise details could not be given about the speed and direction of movement of the water, last-minute measurements were

Looking NNW from the 5·5 metre and Dragon Course into Acapulco harbour, with *Yeoman XV* at the leeward mark (*see* page 75).

Photos by Vernon Stratton

Competitors on the Flying Dutchman Course with *Superdocious* (K163) in the centre (*see* page 75).

(*Opposite page* 81)

Photograph taken at the Ocean Weather Ship Base, Greenock, during the presentation ceremony on 23rd December 1968 to mark the retirement of Captain Elston; left to right: Captain H. Sobey, M.B.E. (the present Shore Captain), Captain G. W. Steer (first Shore Captain, 1947–60), Captain F. A. Elston (*see* page 94).

passed to our boats whenever possible. The pilot of a private aircraft came to our help on the last three days of racing, and an hour before the start of a race he dropped rough charts in waterproof canisters showing the positions of the areas of different coloured water in relation to the Courses.

Our work on the winds and currents attracted quite a lot of local attention and other teams became very curious to know what we were up to and what useful information we had gleaned. In the hotel and Yacht Club we were continually attended by eavesdroppers. Fortunately we were able to exchange information at sea on long-range portable radios working on an unusual frequency. These radios were not of course carried in the boats when racing.

Perhaps the most important contribution to the meteorological effort at Acapulco was that of the crews themselves. Throughout the five weeks of twice-daily briefings, weather and current information was exchanged and discussed frankly and intelligently, but such weather and current information is useless unless those who are using it have the ability to turn it to tactical advantage. With the complex of surface-water currents which obtained on the last few days, and wind shifts of up to 20 degrees in as many minutes, the British gold medallists in *Superdocious* on the Flying Dutchman course, and their bronze-medal colleagues in their 5·5-metre *Yeoman XV* proved that they had the tactical ability required.

At the final ceremony, as Britain's gold and bronze medallists paraded in Acapulco's mini-arena a large Union Jack was released and borne aloft by four 30-gram hydrogen-filled balloons. The British flag rose slowly and gracefully over the arena and some fifteen minutes later entered the thin stratocumulus covering Acapulco harbour.

REFERENCE

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551.46.062.7(261.4):551.46.07(261.4)

International Ice Patrol, 1968

(The following account has been received from the Commander, Eastern Area, U.S. Coast Guard)

In compliance with the terms of the International Convention for Safety of Life at Sea, London, 1960, the U.S. Coast Guard carried out the 1968 International Ice Patrol for the primary purpose of guarding the south-eastern, southern, and south-western limits of ice in the vicinity of the Grand Banks. Rear-Admiral A. J. Carpenter, U.S.C.G. directed operations from Governor's Island, New York. Operating forces included: HC-130B aircraft from the U.S. Coast Guard Air Station, Elizabeth City, N.C.; U.S. Coast Guard Radio Station, Argentia, Newfoundland (NIK); and the U.S. Coast Guard Cutter *Evergreen*, an oceanographic vessel. The U.S. Coast Guard Cutter *Acushnet* was designated as surface patrol vessel but no patrol was required.

In September 1967 a northern pre-season ice-census reconnaissance flight of western Baffin Bay was made and approximately 3,400 bergs were counted. In December 1967 and January 1968 similar flights were made.

Ice Patrol forces reassembled at Argentia in mid-February 1968. (Control of the Ice Patrol remained with its Commander at Governor's Island.) There the Ice Patrol staff directed flights, received reports, maintained ice plots, forecast ice conditions, and prepared ice broadcasts.

The oceanographic vessel *Evergreen* conducted oceanographic surveys in the area where shipping lanes and ice cross the Grand Banks. In addition to routine surveys to determine currents in the area, hourly oceanographic casts at one location for about 30 hours was made.

On 14th March 1968 the International Ice Patrol officially began its 50th season with the commencement of the ice broadcasts. Aerial reconnaissance flights from Argentia, Newfoundland by the Lockheed aircraft were the primary means of determining the south-eastern, southern, and south-western limits of ice.

The first large group of 144 bergs was observed in the pack-ice at 53°N on 28th February. The second large grouping was located at 53°N on 26th March, also in the pack-ice. On 2nd April the first bergs south of 48°N were observed. These bergs were part of the group sighted on 28th February. Northerly winds prevailed along the Labrador coast, rapidly drifting many bergs south. The wind patterns south of 50°N were westerly and many bergs drifted into North Atlantic Shipping Lane FOXTROT. By 25th April there were numerous reports of bergs along the south-east slope of the Banks. In early May it was estimated that approximately half these bergs had been destroyed and the remainder pushed westward into the major berg trap north of Newfoundland because of the intense depression and continued strong easterlies that existed in mid-May. This effectively removed the major threat of a severe ice year developing. The ice threat reached its greatest magnitude during the first ten days of May. After 25th May bergs south of 44° 30′N were relatively infrequent but numerous bergs continued to threaten the shipping lanes along 47°N and 48°N. In mid-June a group of three bergs was reported on the south-east corner of the Grand Banks at about 43°N. By 1st July the iceberg limits had shrunk to about 46°N and the number of bergs continued to decrease after that date until the season was ended on 21st July. During July four bergs were reported as far south as 43°N. A total of 219 bergs had drifted south of 48°N by the end of the season, somewhat less than the 1946–1968 average, and about 60% of the 1900–1968 average.

A summary of Ice Patrol operations is as follows:

1. Six pre-season ice reconnaissance flights to track and plot ice conditions and to prepare for the forthcoming season.

2. Seventy-six in-season ice reconnaissance flights for the main purpose of determining the limits of ice and ice conditions in the vicinity of the Grand Banks.
3. Four in-season ice reconnaissance flights to Hudson Straits to determine the iceberg potential.
4. Two post-season flights were conducted.
5. Ice reports were collected from ships, aircraft, and other ice observing agencies.
6. Pertinent ice information was plotted and analysed.
7. Ice conditions in the vicinity of the Grand Banks were forecast twice daily during periods between observations.
8. Ice advisory bulletins were broadcast twice daily to shipping and passed daily to other interested agencies by teletype.
9. Special ice information was provided to shipping on request.
10. Weather reports, including sea temperatures, were collected by radio from ships traversing the area for the purpose of evaluating ice location, drift, and deterioration.
11. Position plots were maintained on all reporting ships in the Ice Patrol area.
12. Eight oceanographic surveys were conducted for the collection of information affecting the drift and deterioration of ice in the vicinity of the Grand Banks area.
13. The Canadian Department of Transport's Ice Bulletins were closely monitored. Cabot Strait ice information was included in the twice-daily broadcasts and bulletins.

Merchant ships' reports of ice and weather in the Grand Banks area were an indispensible source of ice, oceanographic, and meteorological data, and materially assisted the Ice Patrol in determining the ice conditions and in disseminating pertinent ice information to shipping. When reporting icebergs, ships were requested to describe the shape and estimate the size. The berg description was required to identify and track the individual bergs, while the size assisted in estimating their eventual deterioration.

In addition to ice-sighting reports all ships were urged to make regular four-hourly reports to Radio Station NIK during the ice season when within the area bounded by latitudes 40°N and 50°N and longitudes 42°W and 60°W, including ship's position, course, speed, visibility, sea temperature and wind. The importance of these reports cannot be over-emphasized. Sea temperatures are used to construct isotherm charts employed in estimating the ice deterioration and in detecting shifts in the branches of the Labrador Current. Wind data are useful in estimating set and drift of ice and in forecasting weather for the purpose of planning ice observation flights. An up-to-date plot was maintained on all reporting ships which could, if necessary, be warned directly when approaching dangerous ice.

Ice information was broadcast this year by Coast Guard Radio Station Argentia (NIK) twice daily at 0018 and 1218 GMT (as detailed in *Admiralty List of Radio Signals*. Vol. V). The bulletin generally gave the limits of all known ice, the areas and limits of heavy concentrations, and the positions of individual bergs between the limits and heavy concentrations. The ice conditions broadcast were as observed or reported for the twelve-hour period before the broadcast, or as estimated from the last observations and reports, corrected for wind and current drift. Facsimile ice conditions were transmitted daily at 1330 GMT.

Duplex operations were used between NIK and shipping during the ice season for general communications such as requests for special information, reports made by merchant vessels of ice sighted, sea temperatures, visibility and weather conditions.

Members of the shipping industry are most welcome to visit the offices of the International Ice Patrol, which are located at U.S. Coast Guard Base, Governor's Island, New York, N.Y. 10004.

The International Ice Patrol will again commence full services about 1 March 1969.

THE PLIGHT OF BIRDS WHICH LAND ON BOARD SHIPS AT SEA

(The following is reprinted, by permission, from *The President's Letter*, a periodical leaflet issued by the International Council for Bird Preservation.)

Few people realize the large numbers of birds, principally small land-birds, which seek shelter on board ships at sea, nearly always in a state of exhaustion and frequently stunned by collision with a ship's structure. Fewer still may realize that through association with the Royal Naval Birdwatching Society over the years there are many members of the Society constantly at sea, particularly in the Merchant Navy, who report as members direct to the RNBWS, or in other cases through meteorological logbook reports, of the piteous state of these small birds. Placed in the warmth they would clearly recover if only supplies of suitable 'mixed bird foods' were available.

The case is particularly applicable to British Ocean Weather Ships constantly on their stations on migration routes in the Atlantic. One passage from an RNBWS observer's report may serve as an illustration: "One sees birds so often in a different light to the way most people on land observe them; the pitiful state in which they arrive and the apparent agony in which some of them die. 'Swoop' I find useful for seed eaters and I am taking some meal worms on my next trip to keep Wheatears alive—Snow Bunting recover quickly on seed." RNBWS reports that on one occasion twenty out of thirty Wheatears for which there was no food were reported to have died on board.

The RNBWS is in direct personal contact with its observers on Royal Navy, Merchant Navy and Ocean Weather Ships and is in a position to determine authentic requests for small sums to provide for some suitable mixed land-bird feed on both Ocean Weather Ships and other ships carrying observers trading along regular migration routes, if a fund was available.

Those wishing to help this scheme financially should send contributions direct to the Chairman RNBWS (Captain G. S. Tuck, D.S.O., R.N., 8 Little London, Chichester, Sussex).

Editor's note. The fund envisaged has now been started and grants are being made to the Ocean Weather Ships. The fund available is limited and small grants can only be made in cases where ships trade regularly in areas covered by main land-bird migration routes and frequently have occasion to find birds sheltering on board.

A CENTURY OF VOLUNTARY OBSERVING—THE CUNARD LINE LTD.

Our annual pictorial series of ships of one ownership covering a century of voluntary observing is continued opposite page 72 with three pictures of observing ships belonging to the Cunard Line.

Our association with this company goes back to 16th December 1867 when our instruments were put aboard the *Scotia*, the subject of our first picture.

She was an iron paddle-steamer of 3,871 gross tons, built in 1861 by Napiers of Govan; she is said to have been the most powerful paddle-steamer ever built. Her hull construction was extraordinarily strong for those days; she had six transverse watertight bulkheads, four caisson compartments, a double bottom, five keelsons and diagonal bow framing. She carried 300 passengers, 1,400 tons of cargo and 1,800 tons of coal for a daily consumption of 180 tons. Her promenade deck stretched, at bulwark level, from stem to stern over the deckhouses. In 1864 she made the passage from Queenstown to New York in the record time of 8 days, 4 hours, 34 minutes, an average speed of 14·54 knots. This westbound record lasted until 1881 when it was broken by the *Servia* which was, incidentally, the Cunard Line's first steel screw steamer and their first ship with electric light.

The *Scotia* was the company's last paddle-steamer; in 1878 she was sold to the Telegraph Construction and Maintenance Company, who converted her to a twin-screw cable ship. She was finally lost at Guam in the Marion Islands in 1904.

Her first meteorological logbook was received here on 15th October 1868. It covered the period 16th December 1867 to 17th June 1868, voyages to and from New York; meteorological logbooks appear to have been received from her regularly until 1872.

In those days, more than a century ago, there were seven other Cunard Line ships in the voluntary observing fleet: *China*, *Palmyra*, *Russia*, *Samaria*, *Siberia*, *Sidon* and *Tarifa*.

Our second photograph, representing a middle period of about 50 years ago, is of the *Lusitania*. Launched in 1906 from the yard of John Brown at Clydebank, she was of 31,550 gross tons and was the first Cunarder to have four screws. She and her more famous sister, the Tyne-built *Mauretania*, were built to challenge the supremacy of the Germans on the Western Ocean run. In this they were successful and quite early in her life the *Lusitania* brought the time of the Atlantic crossing down to 4½ days, on one occasion steaming 627 miles in 24 hours. Her sister was later to hold the Atlantic speed record for 22 continuous years.

At the time of her launch, the *Lusitania* was easily the largest ship in the world; she had improved passenger accommodation for 560 first class, 460 second class and 1,180 third class and had a crew of nearly 1,000. It was originally intended that these two ships should become armed merchant cruisers in the event of war but when war was declared in 1914 the Government found that, in spite of their plans, they were not really suited for the work and the *Lusitania* therefore remained in the Cunard service on the Western Ocean run. Her end came with tragic suddenness on May 7th 1915 when, homeward bound, she was torpedoed off the entrance to Cork harbour by a German U-boat. She sank within 20 minutes and 1,198 of her passengers and crew lost their lives.

Her first meteorological logbook was received on 24th December 1907 and covered the period 1st–20th December 1907, a voyage to New York.

The latest Cunard Line ship to join the Voluntary Observing Fleet is the *Queen Elizabeth 2*, the subject of our third picture. The photograph was taken as she steamed down the Clyde on her way from John Brown's fitting-out basin to the dry dock at Greenock last November; it is thus the first photograph taken of this giant ship under way. Her scantlings and equipment have been too well publicized already to need repetition in this journal but of particular meteorological interest is her computer among whose many functions is the processing of meteorological data, including the ship's own observations, whereby the best course and speed to minimise weather damage, discomfort and fuel consumption without delaying the ship, is worked out.

The *Queen Elizabeth 2* was equipped as a Selected Ship in Greenock at the end of November 1968.

Since the days of the *Scotia*, we have seldom, if ever, been without one or more Cunard Line ships in our Voluntary Observing Fleet; today there are 11 of their ships on the list, incidentally including another *Scotia* which 'signed on' in December 1966 when a new ship. This is a good opportunity to place on record our appreciation of the voluntary services which so many masters and officers in the Cunard Line have given over the past century. Their observations have become the backbone of our climatological knowledge of the Western Ocean and, during the past 50 years at least, their radio weather messages have been invaluable.

L. B. P.

METEOROLOGICAL SATELLITES DISCUSSED AT MELBOURNE

(From the Australian News and Information Bureau, Canberra House, London)

Coloured pictures of the world's weather taken by astronauts from orbiting satellites were shown to meteorologists from all over the world assembled in Melbourne last November for a seminar on the interpretation of meteorological satellite data. The seminar was sponsored by the World Meteorological Organization and was arranged by the Australian Commonwealth Bureau of Meteorology.

One scene showing a series of thunderstorms on the horizon at daybreak so impressed the United States astronauts that they took several shots of it. Other pictures illustrated various high-level views of the world's weather taken by the operational meteorological satellites ESSA 1 and ESSA 2 under the control of the United States Environmental Science Services Administration.

Those attending the seminar were told that the first meteorological satellite was launched in April 1960. It was the Television and Infra-Red Observational Satellite (TIROS I) which was equipped with a television camera; for the first time in history meteorologists were provided with an observation platform in space.

TIROS I was followed by launchings of 11 other meteorological satellites of an experimental nature. These launchings culminated in 1966 with the launching of the two ESSA satellites. The near-polar orbit of these two satellites achieved global coverage of the earth's surface. In addition to this, the interaction between the earth's magnetic field and the magnetic momentum of the satellite caused the satellite's orbit to move westward about a degree a day. This is about the same order as the movement of the earth around the sun, about 360° a year, so the orbital plane was sun-synchronous; the sun, earth and satellite remained in the same plane and the satellite passed over a given latitude at the same local time each day.

An Automatic Picture Transmission system was used on ESSA 2. Pictures were taken automatically every 6 minutes and transmitted by slow scanning from the satellite over a 3-minute period following the picture time. The satellite came within the 2,000-mile picture-reception range on two or three orbits a day; two or three pictures, each covering 4,000,000 square miles, could be received on each orbit.

Satellite pictures have already contributed to meteorologists' knowledge of the weather by identification of storm systems in ocean areas adjacent to the continents and by tracing these systems from day to day. Study of the pictures revealed anvils or plumes blowing in certain directions off tropical storms. It was possible to observe whether the plumes were blowing quickly or slowly and the rate could be broken down to three different steps, 20, 50 and 100 mph. Thus the intensity of tropical storms could be measured as well as the direction they were taking. If the anvil or plume were circular this meant there was little or no wind. Such storms brought plenty of rain, but little or no wind damage.

Another point of great value to meteorologists in satellite pictures was that if the storm's plume spreads out over a great distance, the meteorologist can conclude that the upper level winds are stronger than the winds at the lower level.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM OCTOBER TO DECEMBER 1968

October

Throughout the month pressure was exceptionally high over Greenland and this system, together with low pressure over the central Atlantic, dominated the wind flow over the whole area.

Canadian Arctic Archipelago. Winds were mostly south-easterly or easterly, and temperatures were above normal, being up to 6 degc higher than usual in the south. The freezing season was 2–4 weeks behind normal with some open water persisting in the south, and the ice here confined to the shores.

Baffin Bay. Winds were mainly light south-easterly and air temperatures were 2–4 degC above normal. Sea ice was limited to the northern areas, with only a little new ice forming in the bays in the south. The freezing season was about 2 weeks behindhand.

Foxe Basin. Winds were mainly easterly or south-easterly, and they helped to keep the air temperatures about 6–8 degC above average. These warmer temperatures delayed the normal freeze up by about 2–3 weeks.

Davis Strait. Sea and air temperatures were a little above average with the exception of the extreme south-east where temperatures were just below normal. Apart from some bergs the area remained ice-free. Usually some ice could be expected in the extreme north by this time.

Hudson Bay and Hudson Strait. The area remained free of ice, although under normal conditions some ice would appear in the extreme north of Hudson Bay. The combination of light south-easterly wind and air temperature unusually high, in some places by as much as 6 degC, helped to maintain this abnormal situation.

Labrador Sea. Air and sea temperature were a little above normal. The number of icebergs reported was low.

Great Bank and South Newfoundland Sea. Air and sea temperatures in the north and west of the area were a little above normal, but in the south-east they were 2–3 degC below normal. Isolated bergs were reported in the extreme north early in the month.

Greenland Sea. Moderate to strong north to north-east winds persisted for most of the time, keeping the air temperatures below average, by as much as 4–6 degC in the north-west. Sea temperatures were a little above normal at first, but by the end of the month they were mostly below normal. Over much of the area ice amounts were excessive, with the north-easterly winds pushing the ice edge down the coast to about 65°N.

Spitsbergen. Moderate north-easterly winds kept the air temperature low, and at Bear Island the temperature was 8–12 degC lower than usual. The ice edge was well south of the usual position, and open pack ice was reported south of Bear Island by the end of the month. The freezing season was so advanced that the charts resembled the January position rather than the end of October.

Barents Sea. Light winds at first became mainly moderate north to north-east, with the resulting drop in air temperatures, amounting to 6–9 degC below the usual value. Sea temperatures were also below the average by about 2–3 degC. Ice amounts were excessive with the edge 150–250 n. miles south of its normal position. New ice formed along the coasts in the south from the middle of the month onwards.

White Sea. Winds in general were light to moderate westerly, and again air and sea temperatures were rather low. New ice was forming in the bays by the end of the month.

Baltic. Under the influence of north-westerly or northerly winds, air and sea temperature continued to fall, and in the Gulf of Bothnia air temperatures were up to 7 degC below normal, and sea temperatures around 4 degC below normal. Coastal new ice began to form around the middle of the month, which was about three weeks ahead of normal.

November

Low pressure covered the eastern Atlantic, with the centre moving slowly north during the month. The high pressure area which at first covered Greenland drifted eastwards into Europe, and this process helped to cut off the supply of very cold air across Spitsbergen and the Greenland Sea. The development of a high pressure area over the polar basin and the Beaufort Sea brought northerly winds across western Greenland and northern Canada, to replace the south to south-easterly winds that predominated early in the month.

Canadian Arctic Archipelago. Although the early part of the month was relatively warm, the whole area soon became completely ice covered. Northerly winds brought the air temperature well below normal by the end of the month.

Baffin Bay. Winds were mainly light south to south-east with air temperatures above normal, but after the middle of the month northerly winds brought about a complete change with the temperatures falling well below the average. The north soon became ice covered and the edge moved rapidly south. However, in the south and east the ice cover was below the normal.

Foxe Basin. During the first half of the month air temperatures persisted well above the average but later, with northerly winds becoming established, temperatures fell quickly to below average. The area was ice covered by the end of the month.

Davis Strait. Sea and air temperatures continued above average at first, but became nearer average later. Apart from some bergs, the area remained ice-free except for a little new ice forming in the inlets and along the coast of Baffin Island.

Table 1. Baltic Ice Summary: October–December 1968

No ice was reported at the following stations during the period: Riga, Ventspils, Tallin, Helsinki, Mariehamn, W. Norrskar, Turku, Stockholm, Kalmar, Göteborg, Visby, Flensburg, Bremerhaven, Kiel, Gdansk, Copenhagen, Aarhus, Oslo, Kristiansundfjord.

Station	October									November									December								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad	0	0	0	0	0	0	0	0	14	13	31	18	9	4	18	0	0	74	1	31	31	27	1	13	17	0	189
Pyarnu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	17	31	14	14	0	14	0	0	64
Viborg	0	0	0	0	0	0	0	0	—	12	30	19	19	0	18	0	0	—	1	31	31	31	0	12	19	0	—
Klaipeda	0	0	0	0	0	0	0	0	0	16	23	4	3	0	4	0	0	0	17	22	5	0	0	4	0	0	62
Mantyluoto	0	0	0	0	0	0	0	0	—	16	21	6	0	0	6	0	0	—	0	0	0	0	0	0	0	0	—
Vaasa	0	0	0	0	0	0	0	0	28	1	30	27	0	0	27	0	0	122	1	31	31	0	0	31	0	0	189
Oulu	0	0	0	0	0	0	0	0	90	1	30	30	30	0	1	29	0	199	1	31	31	31	0	0	31	0	305
Roytaa	0	0	0	0	0	0	0	0	—	2	30	24	0	16	4	18	0	—	1	31	31	0	27	0	31	0	—
Lulea	31	31	1	1	0	1	0	0	107	1	30	30	30	0	4	26	0	340	1	31	31	31	0	0	31	0	463
Bredskar	0	0	0	0	0	0	0	0	—	9	18	8	0	0	7	0	0	—	0	0	0	0	0	0	0	0	—
Alnosund	0	0	0	0	0	0	0	0	1	9	30	21	3	0	10	0	0	110	1	29	29	0	0	14	0	0	213
Skellefteå	0	0	0	0	0	0	0	0	—	5	30	25	24	0	25	0	0	—	1	31	24	2	0	19	0	0	—
Tönning	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	12	24	13	11	0	13	0	0	—
Husum	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	13	23	11	3	4	10	0	0	—
Emden	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	13	23	11	0	0	8	0	0	—
Lübeck	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	16	18	3	0	0	0	0	0	—
Gluckstadt	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—	13	23	11	0	2	8	0	0	—
Stettin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	31	10	0	0	8	0	0	76

CODE:

A First day ice reported.
B Last day ice reported.
C No. of days that ice was reported.
D No. of days continuous land-fast ice.
E No. of days of pack-ice
F No. of days dangerous to navigation, but assistance not required.
G No. of days assistance required.
H No. of days closed to navigation.
I Accumulated degree-days of air temperature (°C) where known.*

* These figures give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth and of its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.

Hudson Bay. The south was ice-free at first, but ice was forming along the coasts after mid-month. The north started off with some coastal new ice, and this increased quickly to cover most of the region. In general this area was about two weeks later than usual in becoming ice covered.

Hudson Strait. New ice formed along the coasts during the second half of the month, which was about two weeks later than usual. Air temperatures were well above normal at first, but became normal or a little below by the end of the month.

Labrador Sea, Great Bank and South Newfoundland Sea. Ice-free except for isolated bergs. Air and sea temperatures were slightly above normal in the north and west, and below normal in the south and east.

Greenland Sea. The change of pressure pattern was such that although in the south of the area air temperatures were at first well below average, the change to a more south-easterly wind brought the temperature slightly above average. In the north and west temperatures remained well below normal. The overall ice cover was above normal especially in the north and east. The south-easterly winds helped to compact the ice close to the coast. By the end of the month ice extended along the whole east coast of Greenland.

Spitsbergen. North-east and east winds continued to blow over the area, maintaining air and sea temperatures below normal especially during the early part of the month when the air temperature at Bear Island was 12–15 degC below the average. The amount of ice increased quickly and the ice edge was 120–150 n. miles south of its usual position.

Barents Sea. Persistent north and north-east winds kept the air temperatures well down, being 12–15 degC below normal in the north, and 5–8 degC below normal in the south. Sea temperatures were also below normal. The ice cover increased quickly with the north becoming ice covered by the middle of the month, with the edge about 150 n. miles south of its usual position. There was a rapid increase in the amount of ice around the coasts in the south, and the extreme east was nearly covered in ice by the end of the month.

White Sea. Ice began to form along the coasts from early in the month and this seemed to be about three weeks earlier than usual.

Baltic. The Baltic Sea remained ice-free throughout. The Gulf of Finland was clear at first, but ice formed into close pack in the east by the end of the month, this being about three weeks ahead of normal. In the Gulf of Bothnia fast-ice covered most of the coastal areas, and was up to 30 cm thick in the north. This area also seemed to freeze up about 3–4 weeks ahead of normal.

DECEMBER

During the first half of the month a low pressure area just south of Greenland maintained a south-east to east flow across the Greenland Sea, and a northerly flow across the Davis Strait, Baffin Bay and the Canadian Arctic Archipelago. By mid-month high pressure had formed over northern Greenland and the Beaufort Sea, and this produced a cold northerly airflow over Spitsbergen and the north of the Greenland Sea.

Canadian Arctic Archipelago and Baffin Bay. This area was ice covered throughout except for the extreme south-east of Baffin Bay, where a few breaks persisted along the coast of Greenland until very late in the month. Air temperatures were below normal at first, becoming near or a little above normal by the end of the month.

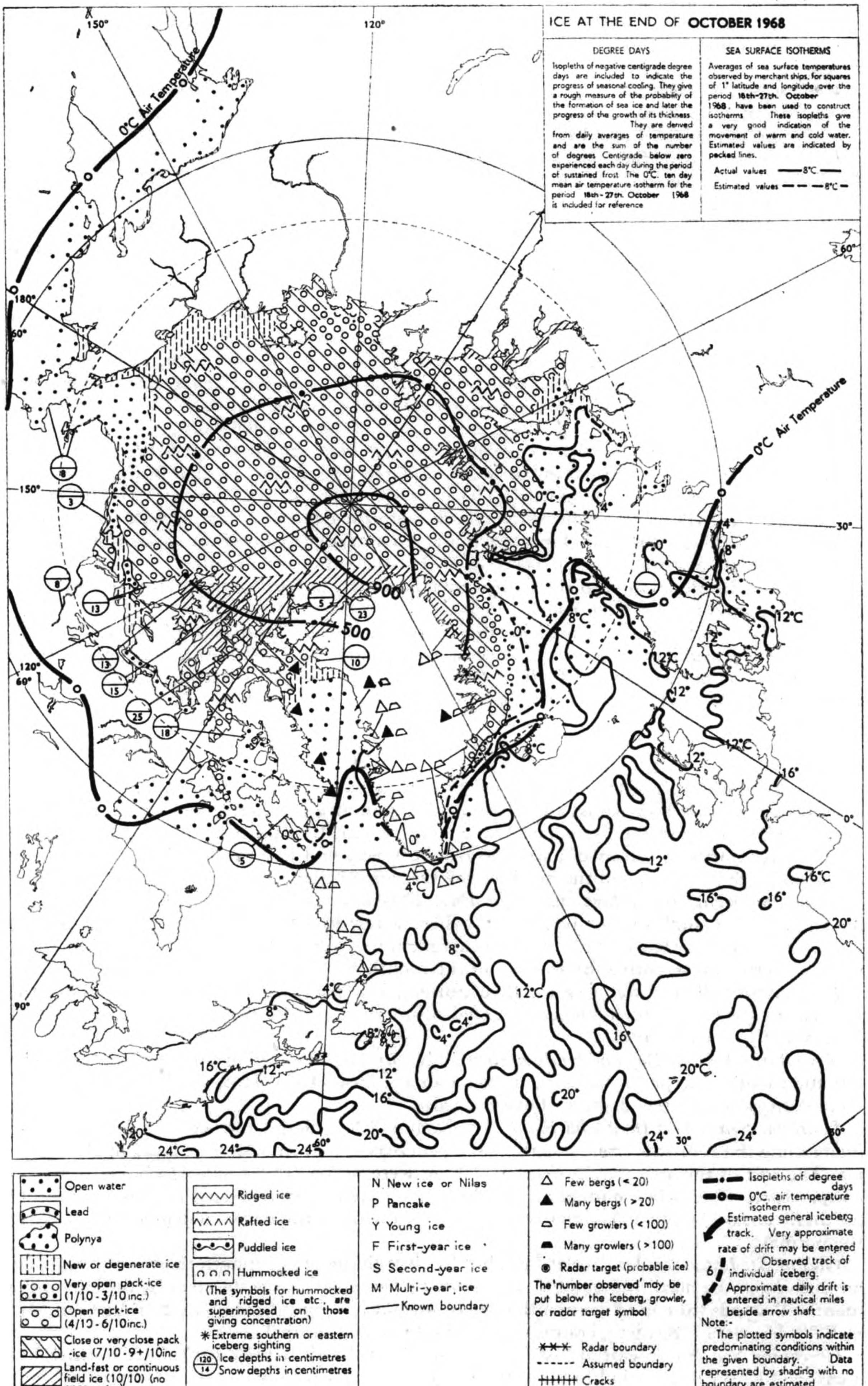
Davis Strait. There was less ice than normal, but pack ice formed rapidly along the Labrador coast under the influence of a cold northerly wind. Both air and sea temperatures were slightly above average.

Foxe Basin, Hudson Bay and Hudson Strait. This area was covered in close pack ice throughout the month, except for some open water in the east of the Hudson Strait at first. Air temperatures were a few degrees above normal.

Labrador Sea, Great Bank and South Newfoundland Sea. Some new ice soon formed in the inlets along the Labrador coast and this slowly increased to form a narrow band of close pack ice. The rest of the area was ice-free, and there were no reports of icebergs being seen. Air temperatures were below normal at first, but they became more normal later once the cold northerly airflow stopped flowing over the area. Sea temperatures were a degree or two above the normal.

Gulf of St. Lawrence. Ice-free at first, but by the middle of the month there was some new ice forming in the north and in the river, becoming close pack ice in the river by the end of the month. Towards the end of the month new ice was forming in the south-west of the Gulf, and in Belle Isle Strait. Sea temperatures were slightly above normal.

Greenland Sea. South-east to east winds at first kept the air temperature above normal, but a change to a northerly wind brought the temperature down to below the normal after mid-


ICE AT THE END OF OCTOBER 1968
DEGREE DAYS
Isopleths of negative centigrade degree days are included to indicate the progress of seasonal cooling. They give a rough measure of the probability of the formation of sea ice and later the progress of the growth of its thickness. They are derived from daily averages of temperature and are the sum of the number of degrees Centigrade below zero experienced each day during the period of sustained frost. The 0°C. ten day mean air temperature isotherm for the period 18th - 27th. October 1968 is included for reference
SEA SURFACE ISOTHERMS
Averages of sea surface temperatures observed by merchant ships, for squares of 1° latitude and longitude over the period 18th-27th. October 1968, have been used to construct isotherms. These isopleths give a very good indication of the movement of warm and cold water. Estimated values are indicated by pecked lines.
Actual values 8°C
Estimated values 8°C
0°C Air Temperature
0°C Air Temperature
500
900
Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10 - 3/10 inc.)
Open pack-ice (4/10 - 6/10 inc.)
Close or very close pack-ice (7/10 - 9+/10 inc
Land-fast or continuous field ice (10/10) (no open water)
Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
* Extreme southern or eastern iceberg sighting
120 Ice depths in centimetres
14 Snow depths in centimetres
N New ice or Nilas
P Pancake
Y Young ice
F First-year ice
S Second-year ice
M Multi-year ice
Known boundary
Few bergs (< 20)
Many bergs (> 20)
Few growlers (< 100)
Many growlers (> 100)
Radar target (probable ice)
The 'number observed' may be put below the iceberg, growler, or radar target symbol
Radar boundary
Assumed boundary
Cracks
Isopleths of degree days
0°C. air temperature isotherm
Estimated general iceberg track. Very approximate rate of drift may be entered
Observed track of individual iceberg. Approximate daily drift is entered in nautical miles beside arrow shaft
Note:-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated

month. The amount of ice was above the usual especially in the north where the edge was about 150 n. miles south-east of its usual position. Ice in the Denmark Strait extended to within 20 n. miles of the north-west tip of Iceland.

Spitsbergen. Light easterly winds at first were replaced by strong north to north-east winds, and this resulted in the air temperatures being about 10 degc below normal. Ice increased steadily in the west of the area to give an over-all coverage well above normal.

Barents Sea. Winds were mainly between south-east and south-west. Air temperatures started off about 15–20 degc below normal, but recovered a little during the month to be only a little below normal especially in the south and east. The north and east remained ice covered, and the ice edge was 100–150 n. miles south of its normal position.

Baltic. There was a slow increase in the ice cover over the Gulf of Bothnia, and also the Gulf of Finland where the extreme east was covered with close pack. This brought the season, as a whole, in line with normal. Some ice formed in sheltered bays in the south, which was a little ahead of normal. Air temperatures were about average, with the sea temperature a few degrees below average.

R. G. H.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown opposite but on a much larger scale (39 × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director General, Meteorological Office (Met.O.1), Eastern Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

Book Reviews

FitzRoy of the Beagle, by H. E. L. Mellersh. 8¾ in × 5½ in, pp. 308, *illus.*, Rupert Hart-Davis, 3 Upper James Street, Golden Square, London W.1, 1968. Price: 63*s*.

It is an honour to have the opportunity of reviewing this book which is the first biography to be written about that remarkable seaman, Robert FitzRoy, who was in command of H.M.S. *Beagle* throughout the time that Darwin was aboard and who later became the first Director of the Meteorological Office. The author is an historian and the bibliography is evidence of the trouble he took in marshalling his facts. The book is not only a history of FitzRoy's life but a study of his complex character against the background of that of Darwin.

As his name implies, Robert FitzRoy had a royal ancestor; the book tells us that he was a grandson of the third Duke of Grafton and thus directly descended from Charles II and Barbara Villiers. FitzRoy was born in 1805 at Ampton Hall in Suffolk. Some of his ancestors had been seamen and in 1818 he entered the Royal Naval College at Portsmouth. In 1828, while serving in the *Ganges* as Flag Lieutenant to the Admiral in Command of the South American station, he was appointed to the command of the surveying sloop *Beagle*, both ships being at the time in Rio de Janeiro. He spent the next two years surveying the coast between Cape Horn and Chiloé Island, about 900 miles up the Chilean coast—surely one of the most desolate, inhospitable and stormy coasts in the world. When the *Beagle* got back to Plymouth in October 1830 she had on board four natives of Tierra del Fuego (three men and a girl) whom FitzRoy had brought to England, on his own initiative, in order to educate them. FitzRoy had promised to take them back home in a year or so and had, in fact, chartered a vessel in order to do this when he was promoted Captain and appointed once again to command of the *Beagle*. For this particular voyage his orders were that on completion of a continued survey of the Tierra del Fuego area, he was to visit many South Sea Islands and return via the Torres Strait and Cape of Good Hope. At FitzRoy's own suggeston it was agreed that a naturalist should join the expedition and a young man by the name of Charles Darwin was selected. In December 1831 the *Beagle* sailed on her 5-year voyage, with a ship's company of 71, and three surviving Fuegians. The author tells us that the overall length of the *Beagle* was about 100 feet and her deck measured some 90 feet by 25 feet at its widest, so there was not much room to spare with this large ship's company and 5 years' stores aboard in addition to scientific and surveying equipment! Fortunately FitzRoy and Darwin were of similar ages and, despite some clash of temperament, were still friendly at the end of the voyage. Having landed the three passengers the ship spent about 3 years of the voyage on the Patagonian survey. The ship's stay at the Galápagos Islands, which FitzRoy surveyed while Darwin laid the keel of his work on the origin of the species, is described in one short paragraph—but this is not surprising because the book is about FitzRoy and not Darwin. The ship duly arrived home and, after writing an account of the voyage, FitzRoy entered Parliament for a brief period during which he introduced a bill which led to a voluntary system of Masters' and Mates' Examinations. After a couple of years as Governor of New Zealand (rather disastrous years because his humanity prevailed over political expedience), he was, for a while, Superintendent of Woolwich Dockyard working on the introduction of steam propulsion into the Royal Navy. During this period he was, deservedly, elected a Fellow of the Royal Society, his achievements having included authorship of the *Narrative of the Beagle*, invention and improvement of a surveying quadrant and his eminence as a scientific navigator. In 1853, as a result of the first International Meteorological Conference in Brussels, he was put in charge of the newly-established Meteorological Department of the Board of Trade with the rather dull title of Meteorological Statist (or 'dealer in statistics', as defined in *The Concise Oxford Dictionary*), with a staff of three people! The main purpose of this new office was to collect observations from merchant ships and thereby to prepare climatological maps of all oceans.

By this time the book has already told us of FitzRoy's independence, restless energy and interest in things scientific, in addition to his humanity and religious feelings and it is not surprising that he did not spend all his time on statistics but was soon thinking about what he could do for the safety of shipping. He did prepare climatological maps and did introduce a 'wind star' or 'wind rose' and then turned his mind to his improved barometer, the preparation of his famous *Weather Book* and the provision of descriptive forecasts of the weather in the newspapers and of visual gale warning signals (North and South Cones) at prominent places around the British coasts. The book explains that these forecasts became possible because of the introduction of "Mr. Morse's electric telegraph", associated with FitzRoy's unique knowledge and experience, for those days, about the practical use of the barometer. As suggested in the foreword to the book, written by Darwin's granddaughter, "No one could value the need of storm warnings more than the captain of a sailing vessel who had faced, for months on end, the winds and waters around Cape Horn". In the *Weather Book* FitzRoy tried to educate the public to the value of weather recording and forecasting and gave practical examples of the value of barometric readings to a seaman, from personal experience. As a lasting memorial to FitzRoy, his gale-warning cones are still in general use, not only in this country but internationally, as well as the words 'synoptic map' and 'forecast' which he coined.

The author gives a vivid description of the frustrations and difficulties that FitzRoy had in his lone struggle to anticipate the weather's behaviour and how upset he was when ridiculed in *The Times* (which had previously backed him up) and by commercial interests because some of his forecasts were inaccurate. It was surprising that he was able to forecast at all with such little scientific background and such an inadequate network, with no synoptic observations from the ocean. Unfortunately for his wife and his close friends, FitzRoy was a fighter who did not give in; throughout the struggle he suffered from a sense of frustration and injustice and his sense of duty was such that he worked harder and harder despite failing health. In April 1865 he gave up the struggle and committed suicide. As the author says, "He died by the equivalent of the Roman way and perhaps he possessed something of the courage of the Romans; he had done what he could with life—let it go".

It was as well that FitzRoy did not live to see his forecasts and storm warnings discontinued—as they were shortly after his death. Were he alive now he would have the satisfaction of knowing that both the forecasts and the storm warnings were soon re-introduced, due to popular demand, and to know that even now the users are not always satisfied with the forecasts. As stated in the last chapter of the book, "The Office now has millions to spend where FitzRoy had hundreds".

C. E. N. F.

Twenty Challenges for the America's Cup, by Captain John H. Illingworth. 8¾ in × 5¾ in, pp. 158, *illus.*, Hollis and Carter, 9 Bow Street, London W.C.2, 1968. Price: 30*s.*

This authoritative account of all the matches so far promoted for this famous trophy, since its inception some hundred years ago to the latest in 1967 between the Australian 12-metre challenger *Dame Pattie* and the defender *Intrepid*, cannot fail to interest the sailing enthusiast, nor indeed anyone interested in Anglo-American relations, which probably includes all readers of this journal.

Captain Illingworth's personal friendship since the early 1920s with many of the colourful personalities intimately associated with the Cup matches—promoters, yacht designers, builders and helmsmen—combined with his long experience of ocean racing as a successful owner and helmsman, guarantee that the subject has been faithfully presented with expert knowledge.

Many readers of this review will remember the thrilling sight of the 'J'-Class challengers of the 1930s designed by Charles Nicholson, Sir Thomas Lipton's *Shamrock V*, and Sir Thomas Sopwith's two *Endeavours*, all three setting over 7,500 feet of sail and the largest racing yachts on both sides of the Atlantic, which were such a familiar spectacle in the Solent at that period.

Interesting details of design and sailing qualities of the 'J'-Class challengers and other famous 'J'-Class yachts which played an important part as trial-horses in working-up periods are an interesting feature of this book.

An account of events leading to the revival of the Cup matches after World War II, and the inevitable changes in the rules to make it possible, together with the author's views on the future of the Cup, and an appendix giving the latest Rating Rule and measurement instruction of the International 12-metre Class will interest many yachtsmen.

The book is well produced in clear print and includes some fine action pictures in the 22 plates. At the modest cost of 30*s.* its success seems assured.

A. D. W.

The Waters of the Sea, by P. Groen. 9½ in × 6¼ in, pp. 328, *illus.*, D. Van Nostrand Co. Ltd., Windsor House, 46 Victoria Street, London S.W.1, 1967. Price: 65*s.*

This is a very fine translation of an oceanographical textbook by a well-known Dutch oceanographer. It is suitable for the scientifically advanced general reader, particularly for ships' officers requiring to 'fill out' their oceanographical background. There is a minimum of mathematics but much up-to-date physical reasoning and it has been produced with the co-operation of British oceanographers from the National Institute of Oceanography. There is an historical introduction discussing the great interest in the sea in ancient times; the Dutch have for centuries been particularly involved with the sea and their coastal defences. The scientific study of the sea, however, is relatively recent; it involves many related modern scientific subjects like studies of sea-ice structure, geology, biology and meteorology and requires very special instrumentation in the laboratory as well as at sea. Voyages of ancient times and the recent advances in the measurement of depth brought about by the invention of the echo-sounder form the main part of the first chapter. Many great voyages were made with very primitive means of observing sea depths; modern bathymetric charts have only been available to mariners as recently as after the turn of the century.

Chapter 2 describes methods of investigating physical, chemical and biological properties of the sea. It shows that sea density and pressure are largely controlled by temperature and salinity which therefore control large-scale vertical and horizontal exchanges. Gases dissolved in the sea (e.g. oxygen, hydrogen and nitrogen) may be used as water-mass labels to trace the history and movements of sea-water—particularly vertical exchanges. It is shown that physical exchanges within the sea are closely associated with biological cycles. There is a final section dealing with the colour of sea-water. The greatest scattering in the clear oceanic water is at the red end of the light spectrum while it is most transparent from blue to green. Coastal waters, the least transparent, tend to scatter blue and red and transmit yellow.

Chapter 3 deals with sea-ice giving a classical account of the ice laden ocean currents, particularly the Labrador current which brings icebergs and pack-ice into the North Atlantic shipping lanes.

There is an interesting account of the discovery of ice islands in the Arctic polar basin. These break off from an ice shelf on the north coast of Ellesmere Island. Observers have been placed on them to investigate the movements of these great 'ice sheets' and the atmospheric and oceanographic conditions above and below the ice. This section contains many fine photographs and diagrams.

Sea waves take the reader over much familiar ground in Chapter 4. There are a number of fine diagrams showing that sea waves have optical properties like reflection and diffraction. There is a final section on internal waves that move over horizontal surfaces within the sea where there is a vertical density discontinuity, i.e. where the sea is in layers and lighter water overlies more dense water. Rapid and complex temperature fluctuations within the sea are associated with internal waves.

Resonance phenomena like seiches, tides, bores and storm surges are the subject of Chapter 5. The latter are of particular interest to the Dutch and are dealt with in some detail and illustrated by the disasters of 1953.

Chapter 6 concerns ocean currents, again covering largely fundamental work, but it includes descriptions of modern instruments and an account of the development of circulations associated with the cold edge of the Gulf Stream. The final chapter is also largely fundamental, describing techniques for analysing the exchange of matter within the sea and the exchange of heat between the atmosphere and the sea surface. The well-known two-way flow at the Straits of Gibraltar where less saline water flows eastwards from the Atlantic to the Mediterranean over the west-flowing heavy saline Mediterranean water is well illustrated. The use of a radio isotope carbon-14 to trace the very ancient history of bottom water is also described giving a modern oceanographic technique. There are many fine diagrams and photographs and a good bibliography. It is difficult to do justice to a book that describes with so little mathematics most of classical and modern oceanography, but it can be recommended to anyone requiring a 'painless' introduction to oceanography.

G. A. T.

Personalities

OBITUARY.—We regret to record the death on 23rd January 1969 of MR. C. J. A. MILLS who was Senior Scientific Assistant to the Port Meteorological Officer in London for 12 years and who retired in June 1967. We offer our sympathy to his widow and his daughter.

C. E. N. F.

RETIREMENT.—CAPTAIN F. A. ELSTON, Shore Captain at the Ocean Weather Ship Base, Greenock, retired on the 31st December 1968 after nearly 22 years in the Ocean Weather Ship Service, the last 8 as Shore Captain.

Frederick Arthur Elston was born on 14th December 1903 and served his apprenticeship with the Elder Dempster Line. After passing for 2nd Mate in January 1923 he was appointed 4th Officer in the Company's service and served in a number of their ships as 4th, 3rd and 2nd Officer. In July 1927 he passed for Master and continued to serve with the Elder Dempster Line until 1930 when he resigned to join the Post Office Cable Ships where he served in all ranks from 4th to Chief Officer.

He resigned from the Post Office ships in 1941 to volunteer for active service in the Royal Navy. Commissioned as a temporary Lieutenant R.N.R. in the same year, he served in command of Admiralty Cable Ships until brought ashore to work with Admiralty scientists on developing harbour submarine-detection devices.

Promotion to temporary Commander followed in 1944 and he continued to serve in this rank until demobilized in November 1946.

Early in 1947 he was appointed Master of *Weather Watcher*, a former 'Flower' class corvette and one of the first ocean weather ships. He stood by her at Rosyth during her conversion and served in her until his appointment as Shore Captain in 1960, except for a few months ashore as Port Meteorological Officer in London in 1955.

The photograph opposite page 81 was taken on the occasion of the presentation of retirement gifts to Captain Elston.

We wish him good health and a long and happy retirement. He is succeeded as Shore Captain by Captain H. Sobey, M.B.E., R.D.

A. D. W.

RETIREMENT.—COMMODORE G. T. MARR, D.S.C., R.D*., R.N.R. retired from the sea when he took the *Queen Elizabeth* into Port Everglades in December 1968 at the end of her sea-going career.

Geoffrey Threppleton Marr was born in 1908 at Pontefract, Yorkshire, and received his early education at The Kings School, Pontefract. He went on to pre-sea training in H.M.S. *Conway* in 1922 and in August 1924 went to sea as a cadet with Elders and Fyffes. He passed for 2nd Mate in 1927 and continued with them as 3rd Officer.

He passed for Master in July 1933 and left Elders and Fyffes for the Cunard Line in December 1936. In July 1938 he was appointed 3rd Officer of the *Queen Mary*.

As an officer of the permanent Royal Naval Reserve, he was called into the Royal Navy for World War II and was initially appointed to the Contraband Control at Ramsgate. In June 1940 Ramsgate became a very important port and he was early across the channel, in command of H.M.S. *Collingwood*, a Drifter, taking part in the evacuation of the British Expeditionary Force from the Dunkirk beaches. He then went to H.M.S. *King George V*, flagship of the Home Fleet, as assistant navigator and was in her at the sinking of the German battleship *Bismarck*. Later he spent a year in the 41st Escort Group with Atlantic convoys. His last war-time appointment, which lasted for 3½ years, was as navigator of an auxiliary aircraft carrier in which he saw service with Russian convoys, Gibraltar convoys and operations in the Atlantic and Pacific Oceans including the relief of Singapore after the Japanese occupation.

After demobilization in February 1946, Captain Marr went back to the Cunard Line and was appointed to his first command, the *Andria*, in 1952; he subsequently commanded eight Cunard Line ships including the *Queen Mary* and *Queen Elizabeth*.

He was appointed Commodore of the Cunard Line on 1st January 1966; he was their last Commodore for, on his retirement, the title was allowed to lapse.

Our association with Captain Marr goes back to 1937 when he sent us his first meteorological logbook from the *Ascania*. Subsequently, in 14 years, he sent in 48 logbooks.

We wish him health and happiness in his retirement.

L. B. P.

Notice to Marine Observers

From 1st February 1969, for a trial period of 12 months, the shore station at Gan will act as a collecting centre for radio weather messages from Commonwealth merchant ships. Call sign: MEX. Radio address: METEO Gan. Watch will be kept at 0001–0400, 0530–0700, 1000–1300 and 1730–2000 GMT on 6265 and 6280 kc/s. The station transmits on 6424 kc/s.

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